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NOTES FOR THE MONTH

Pig Conference at Rothamsted

PIG breeders, feeders, and representatives of the bacon factories met in conference at Rothamsted on March 6, when the subject for discussion was one of considerable importance, namely, "The Production of Pigs for Bacon." A large gathering assembled, including many County Agricultural Organizers as well as research workers on pig husbandry problems. Mr. John A. Fox, Chairman of the Pigs Marketing Board was in the chair.

The first paper was read by Mr. J. B. Busby, of the Herts. and Beds. Co-operative Bacon Factory, Hitchin, his subject being, "What the Bacon Factory wants and how the Danes secure it." The factory wants a steady and adequate supply of pigs of correct bacon type—namely, good length pigs with proper proportion of lean meat, light in the shoulder, and as uniform as possible in carcass weight. The Danes had secured this by great care in breeding and selection on the basis of carcass records, and by technical education and attention to detail. To obtain the necessary lean meat, young pigs were never allowed to lose their baby flesh, and rations containing a high proportion of protein are fed. Suggesting lines of improvement, Mr. Busby said that we must set out to lighten shoulder without losing stamina. The present belly measurements might be abandoned and replaced by three back-fat measurements as used in Denmark.

Dr. John Hammond, of Cambridge, followed with an interesting paper on "Carcass Quality and Breeding for it." The various factors contributing to quality were taken in order of importance and discussed under the following

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headings: (1) Thin back fat, (2) thick streak, (3) firmness of fat, (4) absence of seedy cut, (5) good gammon, (6) length for weight, (7) lightness of shoulder, (8) fine skin.

Dealing with the question of depth, Dr. Hammond said that a thick streak was wanted, but not a long one. Pigs, therefore, must not be too deep, and they should have a straight underline. We should breed pigs that at 200 lb. live weight have just begun to deepen. If sent in before this occurs they will be thin in the streak. It does not matter if the sow is deep so long as her offspring are not too deep at 200 lb. live weight. The only means of ensuring a sound breeding policy was the progeny test, and permanent improvement must rest in pure breeding.

Practical points in pig breeding and feeding were presented by Mr. A. E. Law, of Newborough, Peterborough. His personal preference was for a pure-bred Large White, long in the body and short in the leg, with a straight top line and tight underline. The shoulder should be fine, but not so fine as to lose constitution, and the ham should be wide when seen from behind. After setting out his feeding practice Mr. Law strongly emphasized the importance of securing a pigman who studied his individual animals and was really interested in his work. Details of management were at least as important as the actual foods supplied.

Perhaps the paper that raised the most difficult issues was that by Mr. H. R. Davidson: "Does it pay to produce Grade A Pigs?" Taking the cost of producing a bacon pig as calculated from the price of food in accordance with the formula of the Reorganization Commission (1932), Mr. Davidson showed that since July, 1934, the formula price for a basic pig has been greater than the contract price, and in February, 1935, was so much above it that even a Grade A pig could not show a profit. This result, he pointed out, was largely due to the fact that the price of bacon now also affects the contract price. Mr. Davidson stated that Grade 1 Danish pigs would be Grade C in belly, and therefore in carcass, according to our present standards. The better type of bacon pig was also more economical to produce than a poorer type and therefore, with a little more encouragement in the matter of the quality bonus, producers would have every incentive to supply an increasing proportion of Grade A pigs. Mr. Davidson therefore urged producers to give full support to the Marketing

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Scheme as the instrument by which the necessary improvements could be made.

Earl Radnor then opened the discussion. He said that although there seemed to be a strong feeling against the present belly measurements, there were other points that needed attention, and in particular weight of shoulder. He thought it was possible to choose pigs with a conformation of shoulder that gave both lightness and constitution. In reviewing the various practical points that had been raised, Earl Radnor said that management at the hands of the pigman was all-important, and that an occasional day on half-rations kept the pigs keen on their food.

A general discussion ensued in which Dr. C. Crowther, Mr. Marsh, and a number of farmers took part. The discussion centred round the present system of belly measurement, the feeding of a high protein ration with the object of producing a lean carcass, and the possibility of modifying the contract terms. On all sides the need was stressed for scientific examination of the technical problems underlying the pig industry, although in the immediate future producers were clearly looking to regulative changes to ease their difficulties.

Sixth International Congress for Scientific Management

THE Sixth International Congress for Scientific Management will be held in London, from July 15 to 20 this year, under the patronage of H.R.H. the Prince of Wales, who will open the proceedings on the first day. These congresses, which have been held previously at Prague (1924), Brussels (1925), Rome (1927), Paris (1929) and Amsterdam (1932), are now held triennially for the discussion of papers dealing with the best management practice in all parts of the world, taking into account the changes in world economic conditions; and for the presentation, and if possible the solution, of specific problems in management. They have the further object of providing opportunities for the meeting, in an informal way, of people, from various countries, who are mutually interested in management technique.

The forthcoming Congress will have six main sections—Manufacturing; Distribution; Development; Agricultural; Education and Training; and Domestic. Each of these will consider a principal thesis with, as sub-sections, certain subsidiary or correlative questions. Thus, the Agricultural

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Section will discuss, as the main issue, "Standardization as a factor in Agricultural Development, including Standardization of Equipments, Methods and Produce." The subsidiary questions, consequent on the development of standardization as a factor in agriculture, are management problems relating to (a) mechanization on the farm; (b) the use of accounts in farm management; (c) the preparation of produce for market; and (d) specialized *versus* mixed farming.

The Committee in charge of the Agricultural Section includes Sir George Courthope, Bt., M.C., T.D., M.P. (*Chairman*), Sir Merrik Burrell, Bt., C.B.E. (*R.A.S.E.*), Colonel H. C. Cole, C.B.E. (*Chartered Surveyors' Institution*), Dr. C. S. Orwin (*Agricultural Economics Research Institute, Oxford*), Mr. Christopher Turnor (*Central Landowners' Association*), Mr. J. H. Wain (*N.F.U.*), and Mr. James Wyllie (*Agricultural Economics Society*), with representatives of the Ministry of Agriculture, the N.F.U. of Scotland and the Scottish Land and Property Federation.

British papers in the Agricultural Section are being contributed by Dr. C. S. Orwin, Mr. R. McG. Carslaw (School of Agriculture, Cambridge), Mr. A. W. Street (Ministry of Agriculture), and Mr. W. Lawson (Director of Agriculture for West Sussex). The Rt. Hon. Lord Bledisloe, the Rt. Hon. S. M. Bruce, Lord Cranworth and Sir Charles Howell Thomas, K.C.B., K.C.M.G., will act as Presidents of sections; and the rapporteurs of sub-sections will be Professor J. A. Scott Watson, Mr. James Wyllie, Mr. J. H. Wain and Sir John Russell, O.B.E.

Alternative visits have been arranged for the Agricultural Section: on Friday, July 19, to the farm of H.M. the King at Windsor, and to the farm and factory of Messrs. Chivers & Son, Ltd., Histon, Cambridge; and on Saturday, July 20, to the East Malling Research Station, near Maidstone, Kent, and to the South-Eastern Agricultural College, Wye, Kent.

The Domestic Section of the Congress, under the Chairmanship of Professor Winifred Cullis, C.B.E., will consider, as its main subject, "How far can scientific management in the home contribute to the raising of the standard of life," one of the subsidiary discussions being devoted to "The development of scientific home management in agricultural areas." In connexion with the latter, a British paper has been prepared by a special sub-committee, of which Lady Denman, D.B.E., is Chairman, and Miss

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Ashby, Mrs. Auerbach, Miss Pratt, O.B.E., Mrs. Ward, M.P., and Mrs. Wintringham are members. As comparatively little was known on the subject, in regards Great Britain, an investigator (Mrs. Chisholm) was engaged, and information has been obtained relating to conditions in about 400 rural homes. This investigation was made possible through the kind support of certain individuals and organizations, including the Carnegie Trustees; and it is hoped that the paper will prove a foundation for useful work in the future.

The general organizing of the Congress has been under the ægis of a Council composed of representatives of 63 learned societies, professional institutions, and social, industrial and commercial bodies in this country, with an Executive, comprising a number of prominent people, under the Chairmanship of Sir George Beharrell, D.S.O. The Prime Minister, the President of the Board of Trade and the Minister of Agriculture and Fisheries are among the Vice-patrons of the Congress.

The Headquarters of the Congress will be the Central Hall, Westminster, and some of the group meetings will be held at the Institution of Civil Engineers and at the Institution of Mechanical Engineers, whose premises are close to the Central Hall. H.M. Government are holding a Reception for members of the Congress, who will also be received by the Lord Mayor and Corporation of the City of London at the Guildhall on the evening of the opening day. Other bodies are also extending hospitality to members.

The fee for full membership of the Congress is £2 2s., inclusive of all reports (7 vols.). The fee for those attending the Agricultural Section only is 25s., inclusive of the sectional report and a report of the discussions. Country women, wives and daughters of members, will be admitted to the Domestic Section on payment of a fee of 21s. Further information and membership forms can be obtained from Mr. H. Ward, M.Sc., F.I.C., Secretary of the Congress, 21, Tothill Street, London, S.W.1.

Third International Congress of Soil Science

THE Third International Congress of Soil Science will be held in Oxford, England, from July 30 to August 7, this year, under the presidency of Sir John Russell, D.Sc., F.R.S. The two previous congresses of the series were held in Washington (1927) and in Leningrad and Moscow (1930).

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and were notable for the marked international character of the personnel and the discussions. The forthcoming Congress will meet as a whole in six plenary sessions, at which a general survey of recent advances in every branch of soil science will be made; and it will also work in sections or "Commissions" dealing specifically with (I) soil physics; (II) chemistry; (III) biology; (IV) fertility; (V) classification; and (VI) technology. Three sub-commissions will discuss problems relating to alkali, forest, and peat soils respectively. A 16-days excursion round Great Britain, leaving Oxford immediately after the Congress and terminating in Cambridge on August 23, is being arranged for the benefit of members wishing to obtain first-hand knowledge of British agriculture and soils.

Every member of the Congress will receive a copy of the official Transactions, including the full text of papers read at the plenary sessions, and detailed reports of the discussions at the Commission sessions. The cost of the Transactions will be included in the Congress fee (£2), payment of which will also entitle members to attend all meetings, receptions, etc., held in connection with the Congress. Accommodation, during the Congress, in an Oxford College may be reserved through the Organizing Committee, or privately in hotels or boarding-houses.

Intimation of attendance at the Congress should be sent as soon as possible to the Secretary of the Organizing Committee, Mr. G. V. Jacks, Imperial Bureau of Soil Science, Harpenden, England, from whom all further information may be obtained.

Seed Potatoes

THE following note has been communicated by the Director of the National Institute of Agricultural Botany, Huntingdon Road, Cambridge:—

The time will soon be here for planting seed potatoes, and in this connexion growers may get valuable help from the leaflet which the National Institute of Agricultural Botany issues free of charge direct to farmers or through the County Agricultural Organizers or Horticultural Advisory Officers. This leaflet has just been revised.

Growers are recommended to pay greater attention to the requirements of the consumer, and stress is laid on the enhanced price that is obtainable for ware of such varieties as King Edward and Golden Wonder.

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First early varieties recommended are Arran Crest and Arran Pilot (both immune from wart disease), Epicure, Duke of York, Sharpe's Express and Eclipse. The earliest and heaviest yielding is Arran Crest. Arran Pilot is proving to be a satisfactory substitute for Duke of York and Ninety-fold, and its acreage is increasing annually. Both Arran Crest and Arran Pilot are somewhat susceptible to virus diseases, and care must be taken to obtain seed from a virus-free crop.

The only true second early worth growing is the old susceptible variety British Queen. Most of the early maincrops, however, can be lifted soon enough for this purpose, Great Scot (immune) being particularly suitable.

The best of the maincrops in order of maturity are King Edward, Majestic (immune) and Arran Banner (immune). King Edward is the most popular variety with the consumer and consistently fetches higher prices than others. The yield is lower than that of the other two, and in order to produce a bold sample many soils require liberal manuring. Arran Banner yields heavily. Its tubers are apt to be coarse, and it is recommended that the setts be planted not more than 12 in. to 14 in. apart.

Other varieties mentioned are Golden Wonder, improved stocks of which are now available; Arran Chief, for which King Edward should be substituted; and Kerr's Pink, which, although so widely grown in the north, has unshapely tubers and is very susceptible to blight and to virus diseases.

Whatever the variety grown, it is of the first importance that healthy seed be used. It is recommended that seed from virus-free stocks should be planted at least every second year. In this connexion growers are invited to obtain details of the work that is being carried out by the National Institute of Agricultural Botany at Ormskirk on the production of reasonably virus-free seed in Lancashire.

Disposal of Waste Dairy Products

THE disposal of effluents containing waste milk or milk products has for some time presented a serious difficulty to the dairying and allied trades. If these are discharged into urban sewers the work of sewage purification is greatly increased, and the purification processes may be upset, while if they are discharged into rivers they ferment, and cause serious pollution.

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Work on the treatment of these effluents has been in progress for some time at the Rothamsted Experimental Station, with the assistance of a grant from the Water Pollution Research Board of the Department of Scientific and Industrial Research; this work has indicated that the waste milk effluents can be satisfactorily treated by biological processes.

A grant has now been made by the Milk Marketing Board to the Department of Scientific and Industrial Research for the carrying out of a large-scale experiment on the treatment of milk effluents along the lines already worked out, and for the detailed application of the process to various milk waste products.

Seed Testing Course and Examination

ONE of the incidental results following on the operation of the Seeds Act, 1920, has been a recognition of the importance of the functions of Seeds Analysts generally. Provision was made in the Act, not only for the establishment of Official Seed Testing Stations, but also for the licensing of Private Seed Testing Stations by the Minister of Agriculture and Fisheries, and a number of seed firms maintain such private stations for the sole purpose of testing seeds required for their own purchases and sales.

It has been the custom of the Official Seed Testing Station, Cambridge, to assist in meeting the need for qualified analysts in the seed trade by arranging a periodical course and examination. The course is limited to candidates who are—

- (a) nominated by seed firms who intend to offer employment to such nominees in their own seed-testing station, or
- (b) recommended by Universities, Agricultural Colleges and Institutions, or
- (c) approved by the Council of the National Institute of Agricultural Botany.

A seed-testing course of four weeks' duration, followed by a two days' examination, will be held between June 17 and July 18 next. No course has been held since 1932, and it is unlikely that any course will be held next year.

The fee for the course and examination is £6 6s. *od.*, and for the examination only, £1 1s. *od.*

Full particulars of the course can be obtained from the Secretary, National Institute of Agricultural Botany, Huntingdon Road, Cambridge.

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The Co-operative Granary at Soissons

AN article in the issue of *La Vie Agricole* for December 16, 1934, gives interesting particulars of the co-operative "silo" or grain store that has been erected by the "Co-opérative agricole du Soissonnais." As early as 1920 this society organized a service for cereals to act as an intermediary between the State services and producers. With the development of this service the available means of transport was found to be inadequate, and increased space became necessary. After extensive inquiry into local conditions, the relative importance of various forms of cultivation, methods of sale and delivery, milling, and existing organizations, application was made to the French Ministry of Agriculture for financial assistance, and a store was erected at an easily accessible point on the banks of the Aisne at Soissons.

The objects of the promoters are as follows:—

To receive the various cereals from the co-operators in daily quantities, large or small, at a readily accessible point conveniently situated both for receipt and despatch, on the railways and the river.

To afford co-operators the opportunity of delivering their cereals as threshing takes place, and in exceptional instances when members desire to make a single delivery at the harvest and to spread the sales over the year, to advance them on delivery, by collateral security or otherwise, part of the value of their cereals, the sales of which will take place on their account.

To ensure the preservation of grain by improving and standardizing the quality, and, with that object, to handle and mix it at a minimum cost; to dry it under conditions that cannot be realized in the cultivators' own granaries; to classify wheat according to its bushel weight and baking value, and to make up homogenous lots for despatch and sale.

The expenditure to date has amounted to approximately two million francs, i.e., about 50 francs per quintal, to cover which the following sources of income are available:—

- (i) Shares subscribed, amounting to over 900,000 francs, on May 31, 1934;
- (ii) State subsidy (about 736,000 francs);
- (iii) Long-term loans of 800,000 francs granted by the National Bank of Agricultural Credit.

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Members subscribe for a share of 50 francs per two hectares or fraction of two hectares cultivated by them, and undertake to deliver annually three quintals of cereals per hectare.

The internal regulations prescribe that grain shall be received at the "silo" in accordance with commercial usages; that the gross and bushel weight shall be ascertained on arrival; that a receipt shall be rendered, and that, in case of disagreement, the consignor shall advise the Director within twenty-four hours.

The "Co-opérative agricole du Soissonnais" arranges contracts for storage and carrying over, with the Ministry of Agriculture and with its members who have delivered wheat to the silo, the consignors receiving at the time advances varying according to the season or year. The financing of these advances has been effected by means of guarantees which have been provided by the Regional Bank of Agricultural Credit of the Aisne, supported by the National Bank.

AGRICULTURAL POLICY
IMPORTS OF MEAT INTO THE UNITED
KINGDOM
STATEMENT OF THE VIEWS OF HIS MAJESTY'S
GOVERNMENT IN THE UNITED KINGDOM

THE following statement* on imports of meat into the United Kingdom was presented by the Secretary of State for Dominion Affairs to Parliament by command of His Majesty, March, 1935 :—

I.

1. In a memorandum on " The Live Stock Situation " issued as a White Paper (Cmd. 4651) in July last, copies of which were sent at the time to His Majesty's Governments in the Dominions and to the Government of Southern Rhodesia, attention was called to the very serious decline which had taken place in 1932, 1933, and the first half of 1934 in the prices of fat and store cattle in the United Kingdom market.

2. The present crisis would appear to be due, in the main, to two causes. In the first place, there is the general phenomenon of world depression and the disproportionate fall of agricultural prices. Secondly, the meat industry has been specially affected by the expansion of overseas production, which in some cases has been stimulated by the payment of subsidies.

3. It is clearly impossible for the United Kingdom Government to acquiesce in a situation which threatens ruin to the United Kingdom live stock industry.

II.

4. It is important here to observe that the present difficulties of the United Kingdom live stock industry, as of United Kingdom agriculture in general, are not of its own creation. The agricultural industry, in which the breeding and feeding of live stock are an essential element, gave employment in 1931 to nearly 1½ million persons, and its production was valued at £254 million, of which live stock and live stock products accounted for between 70 and 75 per cent. During the past 25 years the net output of meat in the United Kingdom has remained approximately

* Cmd. 4828, H.M. Stationery Office, price 1d. net, post free 1½d.

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unchanged. During the same period the total population has increased by 10 per cent.; the agricultural population has declined by 14 per cent.; and the imports of meat into the United Kingdom from all sources have increased by about 33½ per cent

5. It will be apparent that neither the general fall in prices during recent years, nor the special fall which is threatening disaster to the live stock industry, are in any sense due to the development of production in the United Kingdom.

6. In this connexion it is to be observed that, while agriculture is the biggest single industry in the United Kingdom, it is a predominating economic interest of the United Kingdom to maintain, and, if possible, to expand her exports of coal and manufactured goods. It has always been, and is still, recognized that the development of Inter-Imperial trade is of primary importance for this purpose. Inasmuch, however, as the rest of the Empire is not in a position to absorb the whole, or even the major part, of the exports (and still less of the potential exports) of United Kingdom industry, it is an essential interest of the United Kingdom to maintain a substantial export of coal and manufactured goods to foreign countries.

III.

7. In devising measures to deal with the meat crisis, therefore, it is the task of His Majesty's Government in the United Kingdom to reconcile the needs—

(1) of safeguarding, with due regard to efficiency, the home industry;

(2) of providing for the due development of Dominion resources; and

(3) of preserving the trade with foreign countries which is essential to United Kingdom export industries.

In endeavouring to meet each of these needs, due regard must be had to the others.

8. In the Ottawa Agreements with Australia and New Zealand, provision was made for reducing the imports of frozen beef and frozen mutton and lamb from foreign countries by amounts rising to 35 per cent., and for stabilizing imports of chilled beef at the level of the basic Ottawa year, namely, July, 1931, to June, 1932. The Dominions on their part agreed to certain temporary measures of stabilization. The United Kingdom Govern-

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ment undertook not to place any restriction on the supplies of meat from the Dominions before the 1st July, 1934.

9. After Ottawa, the United Kingdom entered into negotiations with Argentina, a country which is not only at present by far the largest source of her chilled beef supplies, but in which she has immense capital investments, and with which she carries on a very valuable trade. It was clear in those negotiations that the Argentine Government attaches paramount importance to the preservation of the trade in chilled beef. Nevertheless, owing to the increasing difficulties of the supply situation, the United Kingdom Government reserved the right, in the Agreement that was made, to effect a further reduction in imports of foreign meat into the United Kingdom by reducing shipments of chilled beef by 10 per cent. below the level of the "Ottawa" year provided that the amount so excluded was not effectively replaced by imports of meat from other sources, except experimental shipments of chilled beef from the Dominions. Any reduction by more than 10 per cent. was to apply proportionately to imports from Empire sources. Imports of chilled beef from South America have in fact been subject to an average reduction of 10 per cent. since November, 1932.

IV.

10. The effect of these measures has been that total imports of foreign chilled and frozen beef, veal, mutton, and lamb in 1934 decreased by 1,581,000 cwt., or by 13.55 per cent., as compared with the "Ottawa" year. Imports of Empire dead meat of these categories in the same period increased by 1,123,000 cwt., or 16 per cent. Taking chilled and frozen beef and veal alone, foreign imports decreased by 942,000 cwt., or 9.64 per cent., and Empire imports increased by 1,338,000 cwt., or 81.8 per cent.

11. In the case of beef, it now appears that these various measures were merely palliatives. The forces depressing prices are again in the ascendant. Demand shows no definite signs of increasing, and the weight of supplies on the market remains excessive.

12. The price situation was summarized in the memorandum on "The Live Stock Situation," published in July, 1934, referred to in paragraph 1 above. Since that date there has been a marked further decline in beef cattle prices, which are now well below the already unremunerative figure of a year ago.

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V.

13. In the memorandum of July, 1934,* it was explained that the choice lay between—

(a) a drastic reduction of imports to the point necessary to sustain prices of United Kingdom live stock at a remunerative figure; or

(b) the introduction, in agreement with overseas countries, of a levy upon imports, the proceeds of which would be available for the assistance of the home industry.

In the latter case, it was explained, the quantity of imports might either be left entirely free, or subjected to such moderate regulation as might be thought necessary to prevent the market from breaking altogether. It was further pointed out that, without the consent of the countries concerned, no duty could be imposed on Dominion meat before August, 1937, or on Argentine meat before November, 1936.

14. His Majesty's Government in the United Kingdom are of opinion that a plan based on a levy (with a preference to the Dominions) will afford the best long-term solution of the problem. The possibility cannot be excluded that, in addition, some regulation of the market may be desirable in the general interest of producers in certain cases or at particular times, but His Majesty's Government in the United Kingdom cannot regard as a satisfactory permanent arrangement a system under which the responsibility for the regulation of the market would rest upon them alone. In their view, the intervention of the United Kingdom Government should be limited to the collection of a levy on imports and the application of the proceeds to the assistance of the home industry according to the needs of the market, overseas producers being thus left free to regulate their exports to this market themselves.

15. The immediate crisis was met by a temporary subsidy to the live stock industry, in order to give time for negotiations on the proposal for a levy. The Cattle Industry (Emergency Provisions) Act, 1934, provided for a subsidy not exceeding 5s. per cwt. live weight, on certain classes of cattle for the period ending the 31st March, 1935. It was intended that any payments made under the provisions of the Act should be recoverable from the proceeds of an eventual levy on meat imports.

* In the part of this statement which follows, as in the memorandum of July, 1934, the term "meat" does not include bacon and hams.

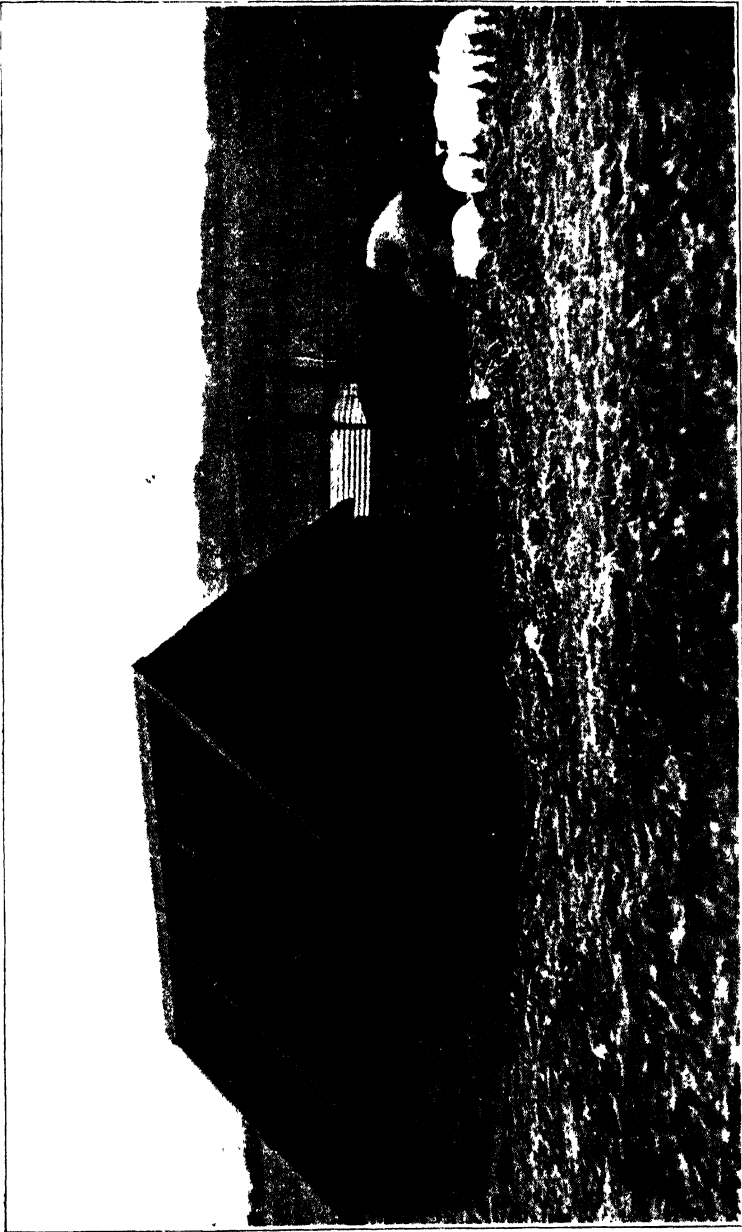


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FIG. 1 Typical arrowing hut made and used on the Farleigh Estate



Fig. 2 Water barrel adapted for pig-feeding purposes on the Farleigh Estate.

Photo. Copyright reserved

AGRICULTURAL POLICY

16. The proposals for a levy have not hitherto proved generally acceptable, but in view of the fact that the only available alternative to a levy is a severe reduction of imports, His Majesty's Government in the United Kingdom desire to present the essential facts of the situation in the clearest possible light. It is with this object that the present statement has been drawn up.

VI.

17. Failing agreement on the payment of a levy on meat imports, His Majesty's Government in the United Kingdom will have no alternative but to take steps to regulate during the currency of existing Agreements the quantity of imports to whatever extent is necessary to restore live stock prices to a remunerative level.

18. The primary object which His Majesty's Government in the United Kingdom have before them in this connexion is to assure to the efficient home producer a reasonable return and not to stimulate an artificial expansion of the United Kingdom live stock industry.

19. In order that the Governments concerned should have a further opportunity to consider the immediate problem, His Majesty's Government in the United Kingdom have proposed to Parliament a continuation of the present Exchequer subsidy for a further short period; but it must be understood that they have no intention either of continuing the subsidy indefinitely or of acquiescing in the ruin of the live stock industry.

VII.

20. To sum up—

(1) It is the firm intention of His Majesty's Government in the United Kingdom to safeguard the position of the United Kingdom live stock industry.

(2) Having regard to the terms of the Ottawa and Argentine Agreements, the only practicable means at present available to them for this purpose is a drastic reduction of imports of meat into the United Kingdom from all sources.

(3) If, however, the consent of the Dominions concerned, of Southern Rhodesia, and of Argentina can be obtained to the necessary variation of their respective Agreements, it would be possible to deal with the situation by the imposition of a levy upon imports of meat into the United Kingdom with or without a measure of supply regulation.

(4) The policy which His Majesty's Government in the United Kingdom desire to bring into operation as soon as they are in a position to do so is to assist the United Kingdom live stock industry, according to the needs of the market, from the proceeds of a levy on imports (with a preference to the Dominions), overseas producers being left free to regulate their exports to this market themselves.

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(5) The question therefore arises whether with the consent of the Governments concerned a levy should be imposed upon imports forthwith, as an alternative to the drastic reduction of imports which would otherwise be necessary.

(6) If so, the following further questions arise:—

(a) Whether all import regulation should cease as from the date on which the levy comes into operation, or whether there should be a transitional period, after the imposition of the levy, during which a moderate degree of import regulation would be maintained.

(b) Whether the levy should be imposed on all meats or only upon beef, veal, and live cattle, bearing in mind that, in the latter case, a higher rate of levy may be necessary than if the levy were applied over the whole field of imported meat and that it would also be necessary to ensure that imports of lamb, mutton, and pork are adequately controlled.

DEPUTATION FROM THE NATIONAL FARMERS' UNION TO THE MINISTER ON MARCH 14, 1935 : REPORT OF PROCEEDINGS

MR. ELLIOT, Minister of Agriculture and Fisheries, who was accompanied by Lord De La Warr, Parliamentary Secretary to the Ministry, and Col. A. J. Muirhead, M.P., on March 14, 1935, received a deputation from the National Farmers' Union on the subject of the Government's agricultural policy. The deputation consisted of Mr. Wain (President of the Union), Major Dorman-Smith (Vice-President of the Union), Mr. Street-Porter (Chairman of the Poultry Committee), Mr. Mervyn Davies (Chairman of the Parliamentary Committee), Mr. E. W. K. Slade (Chairman of the Cereals Committee), Mr. T. Williams (Chairman of the Live Stock Committee), and Capt. Cleveland Fyfe (Secretary).

Mr. Elliot said he welcomed the opportunity afforded by the deputation of dealing more fully with some important aspects of Government agricultural policy on which pronouncements had recently been made. The policy of His Majesty's Government with regard to agriculture could be very simply and briefly stated. It was to encourage the maximum supply of foodstuffs to the consumers in our markets at the lowest price consistent with the reasonable remuneration of the home producer. Mr. Elliot said he desired in the first place to emphasize the closing words of that statement. The policy of His Majesty's Government laid down as a fundamental point the necessity of securing a reasonable remuneration to the home producer.

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Any speeches, any declarations, must be read in conjunction with that. In the second place, he desired to point out again what he was sure all of those present would agree, that the second great object was equally essential, namely to encourage the maximum supply of foodstuffs to the consumers in our markets at the lowest prices consistent with that policy.

Each of these objects had been emphasized by Ministers in recent weeks. The importance of the consumer aspect was stressed by Lord De La Warr in his Dorking speech. The importance of the maintenance of remunerative price-levels had been stressed by the Government as a whole in the recent White Paper on the Imports of Meat into the United Kingdom (Cmd. 4828), a declaration of general policy second to none in importance.

Reasonable remuneration for the producer and close attention to the needs of the consumer were objectives not conflicting with, but supplementing, each other. The Wheat Act had proved that it was possible to safeguard the home producer from the full impact of world economic conditions while maintaining food prices at a level which gave the consumer practically the full benefit of the enormous supplies pressing upon the world markets to-day. Clearly it was to the advantage of all of us if this could be done.

The principle of the Wheat Act was not universally applicable. It was clearly applicable, however, in the case of meat and live stock, and as the deputation was aware the Government not only acquiesce in but desire to apply the levy principle in the case of the live stock industry as soon as they are in a position to do so. Whether it could be applied in the case of some other commodities was a question well worth exploring. The Government had never held the view that quantitative regulation was necessarily in all cases the most appropriate method of assisting the home agricultural industry.

Referring to the policy on live stock developed in the White Paper Mr. Elliot emphasized the fact that it was accompanied by the most explicit assurances to the home producer, in particular, the statement:—

“It is the firm intention of His Majesty’s Government in the United Kingdom to safeguard the position of the United Kingdom live stock industry.”

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Mr. Elliot said that as he had stated earlier in general he then stated again in particular, that the whole statement of policy must be read in the light of these declarations.

Mr. Wain, on behalf of the deputation, thanked the Minister for the statement which he had made, and said that it was the case that the National Farmers' Union had noted with some anxiety statements made by Ministers in recent speeches with regard to Government policy. Farmers had during the past few years instituted far-reaching measures of marketing reform under the Agricultural Marketing Acts. It was, therefore, a matter of the utmost importance to agriculturists generally and in particular to producers registered under the various marketing schemes already in operation, and to those who were engaged in considering and framing further schemes, that there should be a clear understanding on the Government's policy. Apart from the general questions which the Minister had dealt with in his statement, the deputation wished to draw special attention to the position with regard to live stock, barley, dairy products and eggs, and to ask for general guidance as to the framing of further marketing schemes.

Mr. Elliot in his reply said that he took note of the representations made in regard to the commodities mentioned. As to the framing of further marketing schemes, he could give them the words not only of himself but of the Lord President of the Council. Mr. Baldwin, in a statement just made to the Worcestershire National Farmers' Union, said that it was necessary for them constantly to be striving how they might improve their methods of production, organization, and marketing, and that he promised himself to give any support in his power to efforts undertaken by agriculturists as the result of such consideration.

THE BREEDING OF BACON PIGS

THE VISCOUNT LYMINGTON.

THERE are two distinct problems in the supply of bacon pigs for this country. The first lies in the continuous breeding of the right type of pig to meet the requirements of the market, without losing stamina in the breeding stock. The second lies in the most economical methods of feeding and housing the pigs for the bacon market. It is proposed to deal with these problems in two consecutive articles.

The present requirements of the market are largely based on the type of pig bred by the Danes. This in turn has acquired popularity not only through habit but because the lean smaller type of bacon with little shoulder fat suits the palate of the townsman. Cheap butter imported by various means below the cost of production abroad has taken the place of other forms of fat, of which the townsman in any case requires less owing to increasingly sedentary habits, even among so-called manual workers.

Breeding Stock.—The first question one asks is: Can one keep up the stamina and fertility of breeding stock that is continually sacrificed to early maturity and fine shoulders? Though we are to aim at producing bacon pigs between seven and nine score, the breeder himself has to decide on whether early maturity is permanent economy or whether it is likely to sacrifice the all-round constitution of his stock for immediate pecuniary gain. It is true that feeding and housing, as will be shown in the second article, can have considerable effect on the economy of early production, but early maturity that does not run to fat is undoubtedly an inherited quality in animals as in human beings. What we do not know yet is whether this quality is one that, bred for over several generations, is damaging to the constitution. It is nevertheless right that we should keep this in mind and try to gain knowledge to answer the question. It is a branch of research in which all the existing evidence should be collected as soon as possible.

The more serious problem is in the result of breeding for the fine shoulder demanded by the curers. A very intelligent Danish pupil of wide experience told the writer that undoubtedly the stamina of Danish pigs had deteriorated in

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the last twenty years. This he attributed very largely to the need for fine shoulders.

In general the pig that grades well on the shoulder is weak through the heart—the type, in fact, that no breeder likes to see in any animal. There is great danger that this type may become predominant in order to satisfy market requirements quickly. Whatever the faults in the modern show system, it has always demanded an animal that “fills the eye.” Millennia of experience instinctively tell us what “fills the eye,” and we should never lose sight of this.

There are, however, a very few sires among pigs in this country that do conform to the narrow shoulder and are yet strong and deep through the heart and wide in the chest. The type meant is best illustrated by the type of sheep the wool breeders like, where there is no openness between the shoulders. Such sires and sows among the bacon breeds, provided they conform in flank, loin and ham, are worth their weight in gold, no matter what colour they may be.

At present to cross pigs conforming to this idea in order to breed for slaughter is criminal. They are wanted to breed the future stock of the country. If pigs are to be bred only for slaughter then the weak type will do, since the harm they do ends with that generation. If we reject this canon of breeding disaster will overtake the pig breeders of this country. This ideal should be carefully preserved in the standard at shows. It should also be put on a permanent basis, whatever the obstacles, through some improved system of recording whole families as well as individual pigs, for only by that means can we judge whether this quality of conformation is accidental or dominant in particular strains. The time should come when we shall have eliminated most of the bad stock, however fashionable. Then we shall be able to ensure that sires and sows for crossing will be equally sound, and as a result it is very likely that losses will be greatly reduced among store pigs.

Feeding and Environment.—The next consideration in breeding lies in feeding and environment. The pig not only has a delicate stomach, but is by nature a night feeder and wide ranger. The methods we use for fattening for slaughter are, therefore, no guide, when one is trying to

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safeguard the constitution of future generations. In the writer's opinion the intensive indoor method is flying in the face of natural experience, as it is with cattle and horses. Breeding-sows should be kept in the open with plenty of room and on land that is well drained in the winter months. We should not forget that in producing two litters a year we are putting on the sow double the strain that nature intended, and that we are forced to feed with what is often a substitute for the natural foods of the wood-ranging pig. It is, therefore, especially important for us to give all the natural advantages of grass, air and sunlight that are possible. A strong wind-proof portable hut and a fair-sized run are the first requisites. A picture of the typical farrowing hut made and used on the Farleigh Estate is shown in Fig. 1. It will be noticed that the door is in one corner in order to avoid a direct draught if the wind is in the wrong quarter. Only in winter is any appreciable amount of bedding used for warmth. Creosoting the huts at intervals keeps down disease, while it preserves the wood. The runs themselves are shifted every six months so that the ground is never foul and the pastures are improved in rotation. They are also in a line to save fencing and labour. The larger runs of the off-lying sows and those being served follow behind in rotation. A rigid galvanized wire with welded joints is used. This stands being moved without serious deterioration for as long as seven years. It is expensive in the beginning but economical on the whole. For the outside fencing of the pig pasture, tightly stretched barbed wire strands up to 20 inches from the ground prove sufficient to hold the pigs, while a strand of barbed wire at about 3 feet keeps out other stock. In order to economize in feeding a water barrel is used, as shown in Fig. 2. Fixed to a handle on the outside is a feed mixer that can be turned by hand and resembles the beaters of a self-binder in its action inside the barrel. The proper quantity of water and meal* are mixed at the mixing shed, and then one man with one horse can feed sixty sows twice a day. This method avoids the need to keep the feed in fields, carting water for mixing, and then carrying the food in buckets to the individual sow.

* *Suckling Mixture.*

20 per cent. Barley meal.

50 per cent. Weatings.

20 per cent. Maize meal.

10 per cent. Gromax.

Quantities are varied according to the needs of individual sows and the size of their litters.

THE BREEDING OF BACON PIGS

About the relative merits of wet and dry feeding the writer does not feel competent to speak, save that the method described above has proved to be economical in organization and less wasteful of meal than dry feeding. It should be remembered, however, that the natural grazing and rooting of the pig gives it food in which there is a large moisture content and therefore wet feeding, artificial as it is, is nearer than dry feeding to its natural habits. In order to approximate to natural conditions it is the writer's practice whenever possible, as the litter grows rather older to enlarge the run and put several sows together on a wider area, and in summer if practicable to do this on lucerne or heavier forage than the light pasture of winter runs. He has no experience personally, but it may well be that some woodland in the runs would benefit the sows and perhaps save the meal bill as it does with stores in summer time. In fact, where this can be done, oak and coppice and a little pasture would probably be healthier and more economical than any other method provided that there were no conifers for the pigs to damage. This would necessitate the ranching of breeding-stock and mean smaller litters, because the individual sow and litter would be merged in the group.

As much as possible of the writer's stock food is home-grown, but we have yet to learn the effects of artificial manuring on the food value of the grain grown, as well as the value of grain grown on soils variously deficient in minerals. Short-circuiting nature by artificials applied direct to the growing crop may answer in scientific analysis, but it is very doubtful if it answers in actual practice, as experiments in India have suggested. Since, therefore, most grain grown under modern conditions must come under suspicion, the more grass and natural food a pig gets, the less likely is it to suffer in unforeseen ways from artificial feeding. Research on this subject is of real importance for animals and human beings.

Recording.—Having discussed types of stock and the most natural methods of keeping breeding-stock, we come to the question of recording. In the ordinary way the best conformation and constitution in strains of pigs may yet prove uneconomical through lack of fertility. The writer believes that in a naturally fecund species like the pig, high fertility should be one of the indications of good stamina. Modern methods of recording litters give us an

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opportunity of observing much more than mere fertility. For instance, if it were necessary to prove what is universal experience, it would tell us, through records of the litter at birth and at six weeks old, that farrowing rails were essential for the life of the young pigs, and show the difference between using chaff and long straw for bedding in the early days of the litter.

Another of its uses, if recording were to end with the carcass of the pig in the factory, is that it could tell us not only the relative qualities for flesh and early maturity among the strains, but also the value of indoor housing against outdoor methods in the health of the young pigs. It is certainly the writer's experience that tuberculosis is very much kept down by breeding on the outdoor method. In fact the equivalent of only one pig in the last 1,000 has been condemned at slaughter. Even in winter, minerals and other necessities for growth come more naturally into the sows' milk through grazing than in any other way. Weights of litters on this system have been uniformly above the average at six weeks.

The value of recording cannot be too strongly stressed as a practical object. The turnover in pig life is so rapid that results can be obtained far more quickly than with cattle. The strains that will have proved valuable can be used to the utmost, so that only a few years need be occupied in covering England with the right types of pigs.

At present the system of recording is both expensive and incomplete. The policy of subsidies is anathema to the writer, but grants on a generous scale to cheapen and to widen the scope of recording would be of much more practical value than many of the present grants for experiments and education.

Recording, to be complete, must show the size of litters at birth, the weight at six weeks old, and the results in the factory. Moreover, it is still valueless in pedigree breeding unless the story of the whole family and the collateral strains are shown also.

Inbreeding has a bad name because we have inbred from individuals with sound looks, but about whose family tendencies we know too little. There is no reason when we know the whole family to be sound why we should not inbreed very closely, with increasingly good results since virtues as well as taints are thereby intensified. In recording it is not the brilliant individual that counts but the whole

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hereditary capacity of the family. In other words, we want to know where the boat leaks, not the places where it is watertight. All our present systems emphasize the merits in individuals, but cover the defects in families.

Breeds.—The writer has purposely left the vexed question of breeds to the last as he is a heretic on this matter. An intense believer in pedigree, he holds that there is no justice done to pedigree in general by the present breed system. Save for the virtue of colour to avoid seedycut in the bacon, there is no one breed of pigs that is better as a breed than another.

On the ground of colour alone it is his practice to use a Large White boar exclusively for crossing. The ideal Large White sire, as he has shown above, is a rarity and must continue to be so until the good strains are discovered and propagated to the exclusion of all others. Apart from that, he believes that in all breeds there is only a small fraction of pedigree pigs that are sound in constitution, conformation, breeding and milking capacity. He has had experience in crossing with Middle White, Large White, Large Black, Large White Lop-eared and Wessex Saddleback pigs. His preference for bacon production among all these breeds is the Wessex, which curiously enough is the least true to its markings. It may be that the Wessex breed provides a larger proportion of sound animals for milk and fertility and health of progeny; but it is quite as likely that he has been lucky in discovering two or three good strains of the breed and obtained good results from concentrating on them. Thus he would repeat that it is not the breed but the good strain in all breeds for which we must search in the beginning.

In general experience the crossing of bacon with pork breeds undoubtedly means the production of low-grade bacon. On the other hand, owing to early maturity and a second market for surplus pigs as pork, such crosses often produce better cash results than high-grade bonus pigs. While this does not satisfy the straight curer in competition with Denmark, it is a policy by no means to be condemned in the present state of uncertainty for the future.

Disease.—While as yet we know little of pig diseases, we should put our faith, not in "vets," and serums but in sound strains kept in the most natural way. Science that does not rationalize ancient experience is the anarchist.

AN EXTENSIVE SYSTEM OF FARMING

A. J. HOSIER.

THERE is a certain class of agricultural writer, who rarely visits farms, but who writes sentimentally about farms and farming, striving to impress on his town-bred readers that we agriculturists are a very lovable, placid lot, very difficult to arouse from our many centuries of mental slumbers, in spite of our well-known reputation for grumbling. He will proceed to show how changeless are agricultural operations.

Unfortunately, many of these remarks still apply to a certain section of our community; but with the onset of hard times since the War, and the general readjustment of ideas during that period, a large number of farmers realized the necessity for progress. I hope I may claim to be one of them.

For many years, farming complied with a set of hard-and-fast rules, and one was able to obtain a reasonable income by following them almost to the letter. Nowadays, however, methods are altering so rapidly that the go-ahead farmer must be constantly on the qui vive for some improvement. We are in a state of flux; we can abide by no hard-and-fast rules.

Another class of person interested in farming is, like the Athenians, interested in "new things." He visits the farms that have a reputation for "up-to-dateness," sees all, and comes away suitably impressed: on a large proportion of them he finds considerable similarities; many have a similar stock of the latest "fashionable" machinery.

He is, I am afraid, a little disappointed when he comes to Wexcombe; he will find very little of the "popular" machinery. Our implements would appear to have been initiated by Heath Robinson after an agricultural nightmare. That is because I have to design most of my own machinery; however, it is well known that some of this has a way of becoming fashionable after a year or two.

Milking Arrangements.—Perhaps the best-known of my innovations is the portable milking bail: it is by now well known that this consists of a movable shed capable of holding six cows, attached to a hut containing the power plant for machine milking, steam boiler, etc.

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Round the bail is a corral of chestnut fencing capable of containing some seventy cows. The cows are collected here at milking time, milked six at a time, and returned to the pasture. During the milking each cow receives her ration of concentrates, so that she is easily got into the bail, and stands quietly for milking; in fact, during the winter, we are able to replace the corral with a temporary fence dividing the field into two. The cows are one side of the fence, the bail the other, and the former walk up to the bail to be milked in their turn and go out into the other part of the field, returning after milking is completed.

The machine itself is of my own design, having no buckets, since the milk is carried in an overhead pipeline to a special cooler, thence to the churn, all under vacuum. With this outfit it is perfectly practicable to produce Grade A T.T. milk of high quality.

The design of this outfit was necessitated by the change in conditions after the War. During that period, I grew nothing but corn and hay for sale, the chief buyer being H.M. Government, for the Forces. In those days I kept an infinitesimal amount of stock, managing for seven or eight years to maintain the fertility of the soil by the use of artificial manures.

However, it became evident that the organic content of the soil was suffering by this practice; crops began to suffer from disease, or at least to appear "sick." Besides this, I realized that with the end of the War, our markets for corn and fodder could not be maintained—the Army did not require it, and transport in all the large towns was mechanized to a considerable extent.

In 1919-1920, therefore, I sold my arable apparatus—at boom prices—and bought Wexcombe (1,000 acres), then completely derelict and starved by continuous cropping, and bad farming—where crops could be persuaded to grow at all.

I proceeded immediately to lay the whole farm down to grass, to fence off, and lay on water to every field. I possessed no adequate cowsheds, and in any event, milking by hand the number of cattle I proposed to keep would have entailed an imposing wages bill—for although men were paid three times the pre-war rate, they were unable to milk three times as many cows as before the war! Further, the outlying fields on the farm were badly in need of manure, and cost of carting was prohibitive; besides, the treading

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of the cows would be very beneficial in consolidating the new pastures, and, on the old virgin down, in eradicating the heather, and tough, wiry mat of grass.

By some means or other, the cows must be milked out in the fields, just where their presence was required, so that they could tread the ground and act as their own manure-carts. Besides "putting back" on the land what they had taken off, the fact that they would be fed on concentrates and hay would mean that they would pay the soil a considerable rent for the privilege of occupation. Not a pennyworth of manure would be wasted.

All these thoughts gave rise to the first "bail," in 1922. It was a very rudimentary affair compared with the outfits now on the market, but it proved to my own satisfaction that I was on the right lines. The milking machine used in that outfit was imported from New Zealand—a pipe-line and releaser plant.

Since that time I have designed my own plant, and have been improving the whole, step-by-step, as we have gone on, so enabling the "crew" of a man and a boy, with 60-70 cows, to do more in less time, and to produce a better sample of milk. I now have seven of these bail outfits, each dealing with 60-70 cows, and employing a man and a boy or, in some instances, two lads.

All of my outfits are almost invariably moved over their own length daily, this process being facilitated by the provision of a set of pulley blocks, so that the whole bail can be shifted by a light milk-cart horse. The large chestnut corral is kept in the same place for four or five days, being about six times as long as the bail. Each bail has its own horse and rubber-tyred milk cart—we were using rubber tyres for years before medals and prizes were awarded for their commercial development.

When, in 1928, I started to produce Grade A T.T. milk, I considered it necessary to improve the sterilizing arrangements, although the outfits had already taken high places in the County Clean Milk Competitions; I therefore designed a dairy boiler for use with the bail. This has the virtues of providing hot water and steam under pressure of some 20 lb. per square inch, at very short notice, with a very small expenditure of fuel. We connect the boiler to the pipe system and blow steam through, this we found to be preferable to "baking" the apparatus in a steam chest under a low pressure of 1 lb. per square inch.

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Since the cattle have to be tuberculin tested twice annually, some sort of record of each cow had to be kept so that she should be tested at the right time. With our extensive methods of production, it is difficult to know each cow's "family history" as in the case of the intensive dairyman. After a trial of several methods, we have settled upon a method of branding a number on each cow's horn, and each one is registered in our books. We have found this numbering to be of great value in many respects. Cows do not lose their identity as often tends to happen when dealing with large numbers.

The general health of the cattle is excellent; we have less than 1 per cent. casualties. It is of interest to record that rumours of my cattle losses were rampant after the blizzard of 1927-1928. Actually, I did not lose one, though the milk yield dropped badly for two days: within a week it had returned to normal.

When the bail system was running smoothly, and no longer required frequent personal attention, I turned to other types of stock in an endeavour to manage them on unorthodox but profitable lines, bearing in mind my principles of keeping things on the land and producing as much as possible with the minimum of labour.

Poultry Keeping.—I decided to take up poultry keeping, but felt that it would be necessary to design special accommodation for the hens, since no manufacturer—at that time—saw eye to eye with me.

Accordingly, some half-dozen of my well-known "apex" houses were made. In order to find out everything possible about the job, I tended these poultry personally for a year or more, meanwhile making modifications in detail in the design of the house.

Perhaps a short description would not be out of place here: the house is 20 ft. long, and has a triangular vertical section; at one end is the slatted-floor sleeping house, where are also to be found the patented nest trays, which are designed to save the eggs from breakage or from being eaten or soiled by the hens. The rest of the house comprises a run of wire netting, the design of which was arrived at after numerous modifications had been made. Mash boxes, etc., are provided in the run.

Each house contains some 25 birds, which can enjoy a more-or-less open-air life without being able to go where they please. Each unit or "folding pen" is moved daily,

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and in the course of a year will cover an acre of ground. Thus, the hens are on fresh ground each day, their grazing being very beneficial to the pasture, while the advantages due to even deposition of manure all over the pasture are obvious. Under this scheme, the land will not be likely to suffer from that poultry-farmer's nightmare, "poultry sickness," since the birds are always on fresh ground. The avoidance of disease is an important factor. If one should be unlucky enough to import an infectious disease, it is confined to the pens where the infected birds were placed.

These small units also facilitate the culling of birds. The evolution of this poultry-keeping system was not attended by so much ridicule as was the development of the bail milking system, largely perhaps because the fowls were not so obvious as the cows, besides which, the folks who poked fun had learnt that there was method in my madness!

As an economic unit of poultry I have in use some 160 folding pens, comprising a flock of about 4,000 birds. This unit is tended entirely by two lads, with horse and cart specially designed to carry the water, food, and so on, and to return with the eggs. Compare this labour with that on a modern intensive farm with similar output!

The house, with slight modifications, may be adapted for the rearing of young stock.

The whole unit may be (and is) accommodated in the same fields as a dairy herd; the house is designed to withstand the attacks of the cows. Thus, production per acre is doubled. This introduces a "benevolent circle," in that the fowls are provided by the cows with the short grass they prefer, while the fowls repay the cows by making the grass grow more richly for them.

I have been able to prove, with the help of the district advisory chemist and his colleagues, that the grass cut from poultry-treated ground produced silage and hay of definitely higher nutritive value than an "ordinary" grass—higher, even, than that cut in the path of the bail.

Corn Growing.—It is obvious that for some years I had been putting into the soil a considerable amount more than I had been taking out of it. Most of the land had improved beyond all recognition; so I determined to "cash the fertility" which I had produced. This coincided roughly with the purchase of two neighbouring holdings, bringing the total up to about 3,000 acres, so that the scale of my operations could be increased.

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I ploughed up the fields that the bail had so enriched, so that I could take corn crops from them, the land being now quite fresh for corn growing. Concurrently, the arable land was laid down to grass to rest it from corn growing, clear out the weeds, and restore its fertility. With a certain amount of care, it has been possible to put the bail straight on the new pasture, treading in moderation being very beneficial. Excessive treading on young pastures is to be avoided at all costs, since it will damage the young roots, etc.

The close grazing of the cows has the effect of consolidating the land sufficiently to promote a fine growth of clover; while the automatic manure carting previously noted, improves the grass crop amazingly. We have found that these new pastures are able to withstand drought much more successfully than old pastures.

Unless circumstances are exceptional, I avoid the making of hay on the new pastures for the first year or two, as it would further impoverish the land, which has already been exhausted by corn production. Even when hay is made, on new or old pastures, it is always "put back on the land." I never sell hay.

Now to return to the opposite matter of "cashing the fertility." Here also I also do not follow the approved methods. My large single-cylinder Diesel tractors haul a 4- or 5-furrow plough with presser fitted with seedbox, and a chain harrow in tandem. Thus, 6 or 7 acres a day are covered in one operation, with only one man. Lights are fitted so that night work is possible. Cereal crops are then grown until the land begins to show signs of exhaustion, when it is laid down to grass again; so the cycle continues.

Besides the cultivation of wheat, barley, and oats, a considerable acreage is generally devoted to the production of peas-and-oats, which form an excellent forage crop, cut green, for silage or hay. This also allows me to graze more of my pastures.

Harvesting of Hay and Corn.—Now for the harvesting of the hay and corn crops. Most of my hay last year was cut by a power-driven machine of my own design and manufacture. It consists, roughly, of an old Ford car, with chassis, torque tube, and back axle modified so that the back wheels may be replaced by the business part of an orthodox horse-mower. The engine drives the mower

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wheels, so that the machine may be used as a tractor if the cutter bar is removed.

A considerable amount of the corn was cut with an orthodox binder fitted with a light auxiliary engine that drives the mechanism of the binder, the whole outfit being hauled by a light tractor or motor car. This is an improvement on the normal power-drive system, since the outfit can proceed much more slowly in thick and laid corn, while the governors of the auxiliary engine ensure that the binder mechanism works at a steady rate.

Last year, the greater part of my corn was cut loose; further reference will be made to this. In the coming summer I hope to cut a considerable amount of corn with a binder constructed on the lines of my Ford grass cutter, i.e., let the front half of the Ford propel and drive the binder, the whole being run together as a single unit operated by one man.

Silage, hay, and corn are collected by means of patent motor car sweeps—consisting of a sweep of my own design attached to the front of an old high-powered motor car, such as may be acquired for about £5. It takes about five minutes to convert this sweep for collecting silage material, which is conveyed at relatively high speed to a more or less orthodox elevator. I make the silage stacks in the open air approximately where the food will be required the following winter.

For haymaking, we usually employ two gangs. One uses two or three sweeps with a home-made stacker, which deposits the whole load on the rick at once. A considerable amount of hay need never be touched by hand.

The other outfit comprises one or two car sweeps, the elevator, an automatic self-tying baler, and a tractor to drive the apparatus. The sweeps keep two (or three) men at the elevator busy feeding the baler. Only one more man is required to stack the bales, which are delivered to the top of the stack in a continuous line along a board. The man who attends the machinery is available to lend a hand where required. We have found that it is possible to bale the hay in this fashion one, or even two, days before it would be fit to stack in the normal fashion, without heating, so that undue bleaching and loss of leaf are avoided. The baled hay is, of course, extremely convenient for foddering the cattle, excessive waste being avoided.

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I estimate that *one* car sweep, on account of its high speed, can collect as much as two tractor sweeps in the course of a day.

It has always seemed to me that the sheaf of corn had to be handled far too many times, entailing loss of corn with wastage of expensive labour. On my establishment, the corn is cut loose, and swept by cars to a thresher set up in the field. Two men feed an elevator that delivers the corn to a home-made self-feeder on the drum. The threshed-out straw and cavings pass on to the self-tying baler—without manual assistance—and the bales are stacked by one man. The corn may be delivered to a bulk container, thus eliminating a sack man and sack hire. Another man is provided to look after the machinery, and provide temporary assistance where required. Four men altogether!

My critics maintain that the sweeps rob me of half the corn before it reaches the drum. As far as I can discover by running two sets in the same field at the same time, one being provided with waggons, pitchers, and so on, the other as outlined above, little or no difference in yield is apparent. In any case, I do not lose as much as I should by leaving the corn ricks at the mercy of weather and vermin for months. Cost of thatching is saved.

I have investigated the question of combine-harvesting very carefully, and as a large stock farmer, am not very enthusiastic. Straw is an asset to me, and I find that the cost of collecting this (inferior) straw behind the combine, easily counterbalances any extra cost I may incur in harvesting the grain and straw.

This coming summer I hope further to expedite my grain harvest by the use of a grain dryer, made and designed, needless to say, at Wexcombe, together with consequent conveyer belts and bins. The dryer should enable us to start earlier and work later with our threshing; while the conveyers and bins will be extremely useful all the year round to deal with animal feeding-stuffs, when not in use for grain.

General.—It must be added that farm transport is carried out by powerful old motor cars geared down, and fitted with a capacious trailer with driven wheels. These outfits will take a load almost anywhere on the farm, thanks to their four-wheel drive.

Before the inception of the wheat quota and oat tariffs, I used to use my grain for stock feeding, but these aids to

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the arable farmer are inimical to the stock farmer, as they increase the price of feeding stuffs. I have, since the quota, been selling my grain, and expending the proceeds on imported feeding stuffs. Whether as a result of control or not I find that the cost of feeding for milk, meat and egg production has gone up.

I attribute a considerable proportion of my success to the fact that I spend as much time as possible on the farm, and supervise operations personally. I have no patience with farmers who complain about bad times when they spend half of their time and money at market without due cause; or go out shooting and hunting frequently.

My farming appeals to me as being one of the nearest approximations to perpetual motion that I have yet encountered: the fields are always there, but there is that continuous cycle of grass to feed animals, which in return refertilize the land and replace lost humus; then the scene changes—the land becomes arable for a few years, until the good work of the animals has been neutralized, while the land at the same time is rid of any “animal sickness” it may have acquired.

All the time, other fields are alternating with this cycle, but they manage to produce a direct current of profits.

The fowls and cows provide an example of perpetual motion within perpetual motion. The cows keep the grass short for the fowls, which make it grow for the cows.

In my opinion, British agriculture must bridge the gap between imports and exports; and if British farms are run intensively they will do more to reduce unemployment than any other project.

I am all in favour of organized marketing for agriculture, because prices will be more stable, and the farmer will be free to run his farm.

In conclusion, I believe that with the exercise of a reasonable amount of Interest, Industry, and Intelligence, my system of farming can be made to provide a living for the farmer. It is, after all, merely a cheap-to-run business, organized on common-sense lines.

FURTHER EXPERIMENTS (1934) ON THE CONTROL OF THE CABBAGE ROOT FLY

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THE results of the 1931-32-33 field experiments carried out by the writer in the West Midlands on the control of the Cabbage Root Fly were published in this JOURNAL for March, 1932, and May, 1934, respectively. They showed that of the methods at present known, the use of corrosive sublimate applied at a concentration of 1 oz. in 8 gal. of water is the most successful means of reducing the damage done to plants of the cabbage tribe (*Brassicæ*) by the Cabbage Root Fly. The treatment consists in applying to each plant about $\frac{1}{2}$ pint of the solution in such a way as to flood the soil evenly round the base of the plants on three occasions at approximately 10-day intervals, starting three or four days after setting out the plants. Although this treatment can be relied upon to give efficient control under widely different climatic and soil conditions, it is realized that it possesses certain serious disadvantages to its general employment especially on account of the excessively poisonous properties of corrosive sublimate. It was decided, therefore, in the 1934 field investigations to concentrate upon two non-poisonous treatments that had given highly promising results under laboratory conditions in the previous season. Corrosive sublimate was also included in the trials, but at a weaker strength than that employed in the preceding experiments.

Experimental Treatments.—The following three chemical substances were applied to the respective plots at the rates stated below :—

- (a) *Corrosive Sublimate (Mercuric chloride).*—This substance was used at a strength of 1 oz. in 10 gal. of water, $\frac{1}{2}$ pint of the solution being allowed for each plant.
- (b) *Magnesium Sulphate.*—This chemical was used in the form commonly known as "cattle salts" at a concentration of 1½ oz. in 1 gal. of water, 1 pint of the solution being applied to each plant.
- (c) *Tar-distillate.*—A tar-distillate wash for spraying of fruit trees was used at a strength of 1 fluid oz. in 1½ gal. of water, 4 fluid oz. of the diluted solution being applied to each plant.

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With all treatments the solution was applied in such a manner as to flood the soil evenly around the base of the plant. Further, the applications were made on three occasions at 10-day intervals, starting in the case of corrosive sublimate four days after the setting out of the plants, and in the other two treatments on the day of transplanting.

General Lay-Out of Trials.—The treatments were tested at three centres, each experimental area being divided into five plots:—

Plot 1.—Corrosive sublimate.

Plot 2.—Untreated (control).

Plot 3.—Tar-distillate.

Plot 4.—Untreated (control).

Plot 5.—Magnesium sulphate.

At least 100 plants per plot were used at each of the three centres. At all centres, the plants in Plots 2 and 4 were allowed three applications of $\frac{1}{4}$ and 1 pint of clean water, respectively, at 10-day intervals, Plot 2 being treated on the fourth day after transplanting and Plot 4 on the day of planting out.

Plants used.—Cauliflowers of the variety "Improved Eclipse," obtained from the same source, were planted at all centres. The seed was sown in boxes under glass in early spring and the plants set out on the plots in the first week in June in rows 2 ft. apart with 18 in. between the plants in the rows. Dung was not used, but a dressing of compound artificial manure at the rate of 10 cwt. to the acre was given to all the plots at the time of planting.

Effect of Treatments on Growth and Vigour of the Plants.—The plots were examined at intervals during the growing season and notes made as to their general appearance and the condition of the individual plants.

It was soon evident that the dry state of the ground at the time of planting and the prolonged spell of dry weather that followed had a very adverse effect, as the plants remained in a wilted and shrivelled condition for an exceptionally long period during the earlier stages of their growth. This unusual delay in the recovery of the plants from the effects of transplanting was common to all centres, and no difference in this respect could be detected between the various plots. Later in the season, however, a marked stimulation of growth became apparent on the plots where corrosive sublimate, magnesium sulphate and tar-distillate had been applied. This stimulation in the rate of growth

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was also accompanied by healthier appearance of the plants. These beneficial results were most striking where corrosive sublimate had been used, the plants treated with it clearly remaining the most flourishing of all throughout the season.

Effect of Treatments upon Root Fly Injury.—Table I gives details of the time of planting, dates of treatments, and the final counts of the cauliflowers destroyed by the Cabbage Root Fly on the various plots at each of the three centres. The system adopted for assessing the amount of damage caused by the fly under the different treatments was to examine critically each individual plant, healthy-looking plants from a practical standpoint being regarded as unattacked, whilst those of sickly appearance and unlikely to reach maturity were pulled up for examination of the roots.

Table I shows that corrosive sublimate solution (Plot 1) gave highly satisfactory control of the Cabbage Root Fly, especially at Audley Raven's Lane. The average percentage of unattacked plants on the plots treated with this solution at all centres was 81 as compared with 29 for that of the controls (Table II). The increase in the marketable heads or unattacked plants due to treatment with corrosive sublimate was, therefore, at the rate of 52 per cent.

The degree of control given by corrosive sublimate, however, was somewhat less satisfactory than that obtained by this chemical substance in the trials carried out in 1931-32-33, when the infestations, as judged by the number of plants actually destroyed on the untreated plots, were reduced to figures in no instance greater than 9 per cent. A probable explanation of these somewhat contradictory observations is found in the exceptionally unfavourable conditions for rapid root development in the early stages of growth of the young plants in 1934. The very dry state of the soil at the time of transplanting, coupled with several weeks thereafter of abnormally hot weather, greatly prolonged the period of establishment of the young plants. Thus, with the prolongation of this critical period one might expect a less satisfactory control of the Cabbage Root Fly, as it is likely that one or more further applications of the corrosive sublimate solution would be necessary under such unusual circumstances. It is noteworthy in this connexion that the intensity of attack by the Cabbage Root Fly for 1932-33-34 was approximately similar, as judged by the number of plants destroyed on the untreated plots in the various trials and the general observa-

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tions made in the course of advisory work in the West Midlands during these three years.

It may be further noted that the poorer results obtained with the corrosive sublimate solution in the 1934 trials might on the other hand, be laid down at least in some measure to the weaker concentration employed in that year. This chemical substance was used in 1934 at the rate of 1 oz. in 10 gal. of water, whereas in the preceeding three years it had been applied at the strength of 1 oz. in 8 gal. of water. Some considerable evidence in support of the assumption that the variation in the concentration of the corrosive sublimate solution may account for these divergent results was obtained in a field of cauliflowers in East Staffordshire in 1934. The cauliflower crop on the part of the field where corrosive sublimate had been used at 1 oz. in 8 gal. of water was an excellent one, whilst that on the other part where this chemical had been employed at 1 oz. in 10 gal. of water suffered from attacks of the Cabbage Root Fly and yielded on an average 25 per cent. fewer marketable heads.

The results obtained with the tar-distillate and magnesium sulphate solutions are interesting, since both of them, under the conditions of the trials conducted in 1934, can be said to have afforded some considerable measure of protection against the Cabbage Root Fly (Table I, Nos. 3, 5). These treatments gave, on an average for all centres, an increase at the rate of approximately 30 per cent. of unattacked or saleable cauliflowers (Table II). Of the two treatments, tar-distillate proved on the whole slightly superior, but the differences that appear between them at the three centres in Table I are generally too slight to be regarded as of practical significance. In view of the measure of success so far attained with tar-distillate and magnesium sulphate, and having regard particularly to their non-poisonous nature, it is considered that they are worthy of further investigations at higher concentrations.

Summary.—Further field experiments in the West Midlands on the control of the Cabbage Root Fly on cauliflowers are described. The efficacy of corrosive sublimate solution for this purpose was again tested, as well as that of two non-poisonous chemical substances, namely, tar-distillate and magnesium sulphate.

Treatment with corrosive sublimate at the strength of 1 oz. in 10 gal. of water in three applications of $\frac{1}{4}$ pint per plant

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proved the most satisfactory, and consistently afforded a very good measure of control. The degree of control obtained, however, was not of such high order as that in the experiments conducted in the preceding three years when it was used at the concentration of 1 oz. in 8 gal. of water.

The use of weak solutions of tar-distillate and magnesium sulphate gave highly promising results and further experiments with these chemical substances are being undertaken.

ACKNOWLEDGMENTS.—The writer's thanks are due to the Staffordshire Education Authorities and their staffs at Lichfield, Chase Terrace, and Audley Raven's Lane Senior Schools, for assistance rendered in connexion with these experiments.

TABLE I.

<i>Centre</i>	<i>Index of Plot</i>	<i>Date of Planting</i>	<i>Treatment</i>	<i>Dates of Application</i>	<i>Percentage destroyed by Root Fly</i>
Audley Raven's Lane	1	June 7	Corrosive sublimate	June 11, 22,	16'6
	3			July 3	
	5	" 7	Tar-distillate	June 7, 18, 29	56'0
		" 7	Magnesium sulphate	" 7, 18, 29	53'3
	2	" 7	Untreated	—	85'7
	4	" 7	Untreated	—	80'0
Chase Terrace	1	June 5	Corrosive sublimate	June 8, 18, 28	20'0
	3	" 5	Tar-distillate	" 5, 15, 25	22'9
	5	" 5	Magnesium sulphate	" 5, 15, 25	30'1
	2	" 5	Untreated	" —	64'8
	4	" 5	Untreated	" —	59'5
Lichfield	1	June 7	Corrosive sublimate	June 11, 22,	21'2
				July 2	
	3	" 7	Tar-distillate	June 7, 18, 28	40'0
	5	" 7	Magnesium sulphate	" 7, 18, 28	41'2
	2	" 7	Untreated	—	64'8
	4	" 7	Untreated	—	71'2

TABLE II.

<i>Index of Plot</i>	<i>Treatment</i>	<i>Average all centres Percentage of Plants</i>		<i>Increased percentage of unattacked Plants</i>
		<i>Attacked</i>	<i>Unattacked</i>	
2 and 4	Untreated	71'0	29'0	—
1	Corrosive sublimate	19'3	80'7	51'7
3	Tar-distillate	39'6	60'4	31'4
5	Magnesium sulphate	41'5	58'5	29'5

BIRDS IN RELATION TO AGRICULTURE : A POINT OF VIEW

F. HOWARD LANCUM, F.L.S., M.B.O.U., F.Z.S.

DURING the past few years the question of bird protection has received considerable attention, and as the economic aspect of the problem is of greater importance to-day than it has ever been, a few notes on the subject, in so far as it affects agriculture generally, may be of interest.

Those who are concerned with the protection of birds may be divided roughly into two classes:—

(1) Bird lovers who are desirous of protecting all species of birds irrespective of their habits or economic status; and

(2) Others who, while anxious to preserve our bird life as far as possible, advocate some measure of control of species that are either harmful to agriculture, or are to a greater or less extent inimical to the welfare of our bird life as a whole.

It has long since become obvious that an indiscriminate, "whole-hog" policy of bird protection is not only impracticable but is definitely unsound. It is, for example, futile to expect certain small birds to flourish in districts where predatory species are accorded an equal measure of protection. There seems to have been a good deal of confused thinking and careless writing on what is known as the "balance of nature." What is not generally recognized is that the balance, in this country at least, has already been disturbed, and by man. The changed and still changing conditions in this country have borne more hardly on some species than on others. For example, building operations, the felling of trees, and the clearing of undergrowth, have not to any appreciable extent discommoded that ubiquitous bird the house-sparrow. On the other hand, there are certain birds that, having special requirements in the way of food and habitat, have found suitable localities becoming fewer with every succeeding year, with the result that they have had to go farther afield for their requirements and have in some instances suffered serious diminution in numerical strength. This article, however, is not con-

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cerned with the question of bird protection *per se*, but is an attempt briefly to state the position as it affects agriculture and horticulture.

Many species of birds are excellent friends of the agriculturist, doing beneficial work that could hardly be accomplished by other means. Birds such as the beautiful and valuable barn owl, the landrail, the hedge-sparrow, and others, are worthy of all that farmers can do in the cause of their protection and encouragement. There are others that must be carefully controlled, and a few whose harmful activities need to be rigorously checked.

No sensible person desires to see any species of bird exterminated, but it is as well to realize that the man who is dependent on the land for his living cannot afford to be unduly sentimental, even though he may have a genuine liking for birds. If a farmer sees that, by allowing any bird to work its will on his land he is endangering the prospects of himself and his family, he will naturally take steps to remove the menace. He has his living to get and his job to do, and consequently he endeavours to keep down the numbers of species that he knows to be working against his interests, while (if he is a good farmer) he is also careful not to molest birds that he knows from experience are working for his good.

It must be admitted that there are very few British birds that can be said to be wholly or even mainly harmful, but there are some that may without hesitation be listed as enemies of the agriculturist. The most notable of these are the woodpigeon and the house-sparrow. In passing it may be mentioned that even these have their apologists in the ranks of the "all in" protectionists. When considering the status of any bird, the question the farmer has to decide is—does this bird, *on balance*, do me more good than harm? In the case of the woodpigeon there can be no doubt as to the answer. It is difficult, if not impossible, to say anything in favour of this bird, at least from an agricultural point of view. It not only feeds very largely on agricultural crops of various kinds, but on the very pick of the produce in season. It has been suggested that it does a certain amount of good by destroying weeds, but even in this connexion it is a moot point whether its activities are not productive of more harm than good, since there is some reason for the belief that it is instrumental in the distribution of charlock and other noxious weeds. No

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farmer who knows his business will permit woodpigeons to flourish on his land if he can possibly avert that calamity, and any appeal for the protection of the species must inevitably fall on deaf ears. It has been said, with truth, that the woodpigeon has two good points, and two only. It frequently offers good sporting shots for the gun, and it is very palatable. In an economic sense its character is a practically unrelieved black.

The house-sparrow, although a less harmful bird than the wood pigeon, is another species that needs careful control. Frequent but unconvincing attempts have been made to show that the house-sparrow is on balance a useful bird. Its champions rely for the most part on the statement that, in the breeding season, it feeds its young mainly on insects and their larvæ. That is unquestionably true, but it would be difficult to persuade any competent observer to believe that the bird's good work in this direction is anything like an adequate compensation for the damage done by it during the remainder of the year. Further, it should be remembered that after a few weeks young sparrows become as largely vegetarian as their parents, although admittedly both old and young birds take a certain number of insects. In the spring, nothing in a garden is safe from sparrows, which assiduously dig up newly-sown seeds and peck off any green shoot that shows itself above the soil. Amongst ripe and ripening corn, sparrows are an unmitigated nuisance. It is a common thing to see wheat borne down with the weight of flocks of sparrows, intent on attacking the grain in ear. Ricked wheat, also, is very often attacked, and much harm is done in this way. It has been claimed that sparrows take only waste grain, an assertion that is quite untrue. Sparrows do considerable damage to thatched roofs, and are a serious source of annoyance by blocking up rain-water pipes with their nests.

One of the major charges that can be sustained against the house-sparrow is that it habitually robs house-martins (among our most useful birds) of their nests. In many districts the martins breed with the greatest difficulty, their nests being commandeered by sparrows, sometimes even before completion. Last year, in South Devon, the writer saw around the eaves of a single barn 17 house-martins' nests, of which no fewer than 11 had been taken by sparrows, a condition of affairs that may be discovered in many parts of the country.

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It should be noted that, even in the country, house-sparrows are rarely found very far from human habitations, and for a very good reason. It is in the vicinity of man and his labours that these birds are able to find the food they like best, and this consists largely of cultivated crops. Clearly, then, it is asking too much of any farmer or gardener to refrain from destroying sparrows on his premises.

It is to be feared that the starling, also, must now be regarded as a harmful bird. At one time a beneficial species, it has of late years increased to such an extent that it has become a serious nuisance in many districts. As with some other birds, its abnormal increase has resulted in a modification of feeding habits, to the definite disadvantage of farmers. The starling does good work in the destruction of "leather jackets" and other noxious larvæ, but its depredations amongst grain and fruit orchards are becoming a subject of serious concern.

The bird lover has an additional grievance against the starling in that it frequently ousts woodpeckers from their newly-excavated nesting holes. Any reader who doubts this statement is invited to observe the freshly-cut woodpecker holes in his own district, and to note how many of these are occupied by their rightful owners, and how many by starlings. It is a regrettable fact that, although the green woodpecker has something like twice the fighting weight and bill power of the starling, a battle for the possession of a nesting hole almost invariably results in a victory for the latter. It will be a bad day both for ornithology and for agriculture if we lose the green woodpecker as a native species, simply because we have too many starlings. That is a possibility by no means as remote as it may appear. The choice between starlings and woodpeckers is one that is not difficult to make, and it is quite obvious that it is folly to give both species an equal measure of protection.

There are many birds whose habits are the cause of loss in certain branches of agriculture, while remaining more or less harmless to other phases of the industry. Such birds as the magpie, the jackdaw, and the jay are capable of doing much damage on a poultry farm. The magpie and the jackdaw are both inveterate egg thieves, while the jay is sometimes a nuisance to the gardener, having a special liking for peas and soft fruit. On the whole, however, it

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is probable that all three birds are, on balance, beneficial to agriculture, having in mind the many pests destroyed by them. The magpie and the jay are heartily detested by the average gamekeeper, and with good reason. He, as a man whose work is the preservation of game, cannot be expected to tolerate birds that destroy numbers of eggs and young of game. That, however, is a matter not within the scope of this article.

That beautiful small bird, the bullfinch, is at times one of the most troublesome visitors to orchards and gardens. Whereas many birds are supposed to take fruit and other buds for the sake of the insects or larvæ within, the bullfinch will pick them for themselves: often indeed for no apparent reason at all. The greenfinch also at certain seasons does a good deal of harm in gardens. It follows, therefore, that whatever may be the habits of the bullfinch and the greenfinch elsewhere, no fruit grower is likely to permit them free access to his trees and bushes. On the other hand, the interesting members of the tit family are well worth while encouraging by any gardener, as they do an immense amount of good and very little damage.

In recent times, the rook has probably been the subject of greater controversy than any other British bird. The present status of the rook seems to be much the same as that of the starling. It was once known (and rightly so) as the "farmer's friend." Nowadays, in some districts its changed habits are resulting in harm to agriculture. How far such change is due to its own increase, and in what degree the increase in the starling and other birds and the consequent shortage of natural food is responsible, is rather uncertain. At any rate, it may be said of the rook, in common with certain other birds, that an undue increase in population is demonstrably bad for agriculture.

It has been submitted, in defence of certain birds that are listed as harmful, that their depredations are committed mainly at well-defined seasons of the year. That may be true, but it is as well not to lose sight of the fact that the seasons are usually those that are vitally important to the agriculturist. They are, in short, seed-time and harvest.

The average farmer probably cares very little about the balance of nature, nor is he desirous of reducing to the verge of extermination any species of bird, but it is unreasonable to ask him to refrain from destroying birds that he knows are inimical to his interests, any more than he

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could be expected to leave unmolested rats and other vermin whose work represents to him a financial loss.

Besides those already mentioned, there are a great many British birds that can safely be regarded as wholly or almost entirely beneficial. To name a few, the wagtails, the warblers, the swallows, the martins, the wren, the hedge-sparrow, the robin, the spotted flycatcher, the kestrel, the wryneck, the lapwing, the nightingale, the redstart and the tree creeper—to these the agriculturist will be well advised to give all the protection and encouragement in his power. In many instances, it is not easy to show how the birds may be actively protected, but any farmer or gardener can at least take care not to harm any of them or their nests or eggs, and ensure that no workman in his employ does so. In a fair number of instances it is possible, by the provision of suitable nesting boxes, to encourage birds to breed and increase on farms, in orchards, gardens and elsewhere.

CHESHUNT EARLY GIANT LETTUCE : A NEW FORCING TYPE

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WORK on lettuce as an autumn and winter crop in glass-houses was commenced at Cheshunt in 1926, when an attempt was made to find a crop that could be grown at a time when the houses are usually empty. During the first four years, varieties having a wide range were tested, and although the best proved to be Golden Ball, Gotte (a forcer) and Green Frame, none of these could be induced to heart after the middle of November and before the middle of March. The crop marketed between these dates was of the loose-leaved type, which the salesmen in Covent Garden do not want, and which they cannot sell except at unremunerative prices.

It was obvious that if the growers of this country are to supply fresh lettuce to the public and compete with foreign imported produce a new variety must be raised that will form a solid heart during the short days of the year.

The work of hybridization that was planned for 1931 was suddenly stopped by the chance occurrence of a very mixed batch of Golden Ball grown during the winter of that year. In this batch only 40 per cent. were true to type; the remainder were much darker in colour and contained a percentage of coarse-leaved types in which the rosette was open and the leaves lay almost parallel to the ground, often having a span of 16 inches from tip to tip. The proportion of marketable heads did not exceed 50 per cent., and the appearance of the crop was a clear indication that the variety had been accidentally crossed in the field. Five abnormally well-hearted plants were lifted, transferred to 12-inch pots and grown for seed. By selection from a very mixed progeny, the new variety Cheshunt Early Giant has been raised and seeds have been distributed in small batches to 200 growers for 1934-35.

Market crops have been grown at Cheshunt for Christmas 1933, February 1934, and Christmas 1934, with satisfactory results.

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Christmas Crop, 1933.—This crop was marketed during the ten days before December 23. The plants were remarkably good, with firm tender hearts, giving an average weight of 5 oz. per head. They were sold at an average price of 6s. per dozen, when the other varieties were not realizing 3s. per dozen.

February Crop, 1934.—This crop was adversely affected by long periods of fog in January and February, but it was marketed before March 9. The individual heads averaged 7 oz. each, some weighing as much as 8 oz.

If the following experience can be taken as a guide, the quantity of foreign lettuce that is found in Covent Garden at certain times of the year is evidently due to some extent to the absence of an adequate supply of really good home-grown produce.

In February, 1934, the first consignment of Cheshunt Early Giant lettuce, 82 crates each holding two dozen heads National Mark quality, was sent from the station to Covent Garden on February 23.

It realized an average price of 4.7s. per crate, half being sold on February 24 and half on February 26.

A second consignment was sold on February 27 and 28 at an average price of 4.2s., and in view of the low prices a visit was made to Covent Garden. It was found that the market was filled with crates of Spanish lettuce, selling for 5s. to 6s. per crate. This lettuce was a large coarse sample of which less than half of each head was fit for salad making, and even this portion was extremely tough. No more lettuce was cut until March 5, when the salesman asked for another consignment. This sold for 5.6s. per crate, and we were told that this tender well-hearted English lettuce had created a good demand. Later consignments sold for an average price of between 6.5s. and 7s. per crate up to the end of the crop, and were actually realizing higher prices than the large Spanish lettuce.

It would seem, therefore, that Cheshunt Early Giant lettuce can be the means of reducing the value of imported lettuce on the home market, and so help towards reducing the imports of this vegetable.

Christmas Crop, 1934.—This crop was also adversely affected by long periods of fog in November and December, and the quality was not so good as that during the same period in 1933. Further, market prices for all vegetables



Photo Chesnut Research and Experimental Station

The Chesnut Early Giant Lettuce

CHESHUNT EARLY GIANT LETTUCE

were low in comparison with previous years. The crop started at 5s. per crate of two dozen and finished at 6s. per crate with a few at 7s. per crate.

Reports from more favoured districts are very gratifying. Cheshunt Early Giant lettuce has been grown alongside the older varieties and has proved to grow more quickly and develop good hearts during the short day period. In many cases it is three weeks earlier than other varieties when grown in glasshouses.

The results show that the variety Cheshunt Early Giant is a great improvement upon the old types for autumn and winter work, for it is the only variety that will produce a solid heart when the period of daylight is less than ten hours. Cheshunt Early Giant is a forcing cabbage lettuce in which the leaf bears some resemblance to that of the Gotte types, except that it is much larger and somewhat darker in colour. It develops quickly and under favourable conditions it is ready for market in ten weeks from planting. It has a compact habit, forming a large firm heart under winter conditions, and every portion of the plant is tender and edible.

Cheshunt Early Giant is not susceptible either to tip burn or to internal rot. It stands well, and does not bolt before the end of April. Being a short-day type it is not suitable for cultivation between May and August.

It presents an attractive appearance in the market, which is enhanced by the fact that the stem is unusually narrow.

The enclosed photograph was taken in the experimental houses at Cheshunt on February 14, 1933, and illustrates the chief characteristics of the variety.

MARKETING NOTES

Milk Marketing Scheme.—February Sales and Pool Prices.—The wholesale buying price for “liquid” milk in all regions remained at 1s. 5d. per gal. Pool prices and rates of producer-retailers’ contributions for February are given below, with comparative figures for the preceding month and the month of February, 1934:—

Region	Pool Price (d. per gal.)			Producer-Retailers’ Contributions (d. per gal.)		
	Feb. 1935	Jan. 1935	Feb. 1934	Feb. 1935	Jan. 1935	Feb. 1934
Northern ..	14	14½	13½	2½	2½	2½
North-Western ..	14	14½	13½	2½	2½	2½
Eastern ..	14½	14½	14½	2½	2½	1½
East Midland ..	14½	14½	14	2½	2½	1½
West Midland ..	13½	14	13	3	2½	2½
North Wales ..	13½	14½	13½	3	2½	2½
South Wales ..	14	14½	13½	2½	2½	2½
Southern ..	14½	14½	14½	2½	2½	1½
Mid-Western ..	13½	14	13	3	2½	2½
Far-Western ..	13½	14	13	2½	2½	2½
South-Eastern ..	14½	15½	14½	2½	1½	1½
Unweighted Average	13.98	14.45	13.61	2.64	2.28	2.04

Producers-retailers who did not sell milk by wholesale during the month otherwise than on contracts carrying level delivery premiums were credited with a level delivery premium of ½d. per gal. The Board’s levy for expenses, liabilities and reserves remained at ¼d. per gal., as in the previous month.

The estimated sales under contract during February were 61,440,045 gal., compared with 52,430,512 gal. in February, 1934. Liquid sales (42,936,640 gal.) were nearly 1,800,000 gal. higher than a year ago, and the daily average showed an increase of 27,600 gal. over average daily liquid sales in January, 1935. Manufacturing sales (18,503,405 gal.) were practically the same as in the previous month and much higher than in February, 1934, (11,380,342 gal.). The proportion sold for manufacture constituted 30.16 per cent. of total sales, compared with 28.4 per cent. in January, 1935. The average realization price of manufacturing milk was 6.27d. per gal.

Milk manufactured into cheese by farmhouse cheese-makers further declined from 215,739 gal. in January to 212,791 gal. in February.

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Hops Marketing Scheme.—*Payments to Registered Producers.*—Trading in fulfilment of brewers' estimated requirements has now been completed, and the Board have paid to every registered producer 98 per cent. of the valuation placed upon his quota hops.

Pigs and Bacon Marketing Schemes.—*Price of Bacon Pigs for March.*—The price of the "basic" pig (Class 1, Grade C) for March was 11s. 11d. per score, compared with 11s. 5d. for February.

Contract Arrangements for 1935.—The issue of a form of supplementary contract for the sale of pigs by producers to the Pigs Board, for delivery during the last 8 months of 1935, was referred to in the JOURNAL for March. The Board have now prescribed a form of supplementary direct contract between producers and curers. This is on the same terms as the supplementary contract with the Board itself, but is so worded as to be valid only if the curer concerned has not already obtained, on previous contracts, 70 per cent. of his stated requirements for the period in question. The aim is to obtain sufficient pigs on supplementary contracts to ensure that all curers receive 70 per cent. of their requirements in the last 8 months of the year.

Elections of Board Members.—The Pigs Marketing Scheme provides that an election of district members representing 4 of the 8 districts specified in the First Schedule to the Scheme shall be held in February each year. Elections in the Northern and West Midland Districts and Scotland, held on February 23, 1935, resulted in the return of the three sitting members, Messrs. J. A. Fox, J. H. Wain and J. Blackley. The retiring member for Wales, Mr. Mervyn T. Davies, was returned unopposed.

On March 15, 1935, at the Annual General Meeting of registered pig producers, an election of one special member of the Board was held in accordance with para. 7 of the Scheme to fill the vacancy caused by the retirement of Lord Radnor. The special member elected was Captain E. T. Morris.

The annual elections of representative members of the Bacon Marketing Board resulted in the return of all the retiring members.

Pig Contracts in 1935: Area Increases.—The following figures show the percentage increase in the number of pigs contracted for delivery in 1935 as compared with 1934, in

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each of the 8 districts as defined under the Pigs Marketing Scheme:—

					% Increase.
Area	1.	South-Western	..	..	7.23
	2.	South-Eastern	..	..	13.34
	3.	Eastern	..	..	7.83
	4.	East Midland	..	..	5.27
	5.	West Midland	..	..	7.95
	6.	Northern	..	..	36.23
	7.	Wales	..	..	16.06
	8.	Scotland	..	..	21.98
Total					12.40

The most striking increases were in the north of England and in Scotland; the smallest were in eastern districts and in the west and south-west. In the south-west, however, bacon-pig production in 1934 was already high in relation to pig population.

Amendment of the Pigs Marketing Scheme.—Notice was published in the London and Edinburgh Gazettes of March 1, 1935, of the submission by the Pigs Marketing Board, to the Minister of Agriculture and Fisheries and the Secretary of State for Scotland, of a number of proposed amendments to the Pigs Marketing Scheme. Copies of the amendments can be obtained from the Board at Thames House, Millbank, London, S.W.1, price 2d., post free. The period for lodging objections or representations with respect to the amendments expires on April 16.

Remuneration of Board Members.—At the Annual General Meeting of registered curers, held on February 26, an additional sum of £1,000, making £3,800 in all, was voted as remuneration of members of the Board for the year ended March 31, 1935. The sum of £5,000 was voted as remuneration for the following year. In each case the division of the sum between members was left to the Board.

The registered pig producers, at the Annual General Meeting on March 15, voted remuneration as follows in respect of the year ended March 31, 1935: Chairman, £1,000; Vice-Chairman, £750; other members, £300 each.

Potato Marketing Scheme.—Riddle Regulations.—The Potato Marketing Board announce that the census of potato stocks taken by them in February indicated that stocks of main crop potatoes slightly exceeded the probable consumption during the remainder of the present season. The Board attribute this to the fact that the mild weather that has prevailed during most of the winter has resulted in a

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decreased demand. A drastic revision of the riddle regulations for ware potatoes was, therefore, made by the Board on March 7. A minimum riddle of $1\frac{3}{4}$ in. was prescribed for "King Edward," "Red King," and "Golden Wonder," and a minimum 2 in. riddle for all other varieties. A further regulation is that no potato above 1 lb. in weight shall be sold for human consumption. These regulations apply to the whole of Great Britain. The Ministry of Agriculture for Northern Ireland has agreed to adopt the same riddle standards.

Census of Retailers.—A census of retailers operating in Northampton, Newcastle-upon-Tyne, Cardiff, Reading, Oxford, Leeds, Sheffield, and Leicester, reveals that, excluding co-operative societies and other types of chain stores, there is, on the average, one retailer of potatoes to every 838 of the population.

Committee of Investigation for Great Britain.—The Committee sat on March 4 to 6 to hear evidence concerning two complaints lodged against the Pigs and Bacon Marketing Schemes. The Parliamentary Committee of the Co-operative Congress and the National Federation of Meat Traders' Associations were the complainants in one case, which had reference to the arrangements made in the pig contract as regards the carriage of pigs by rail at a flat rate. In the other instance, the Parliamentary Committee complained of the omission from the contract of any requirement that the producer should effect an insurance of the pigs contracted to be delivered.

Pork (Import Regulation) Order 1935.—The following press announcement was made by the Board of Trade on March 4:—

The Board of Trade have made an Order under Section 1 of the Agricultural Marketing Act, 1933, regulating imports of pork from foreign countries. The Order, which is subject to approval by Parliament, comes into operation on March 12, 1935, and provides that, as from that date, no pork may be imported from any foreign country except:—

- (a) under a licence issued by the Board of Trade; or
- (b) under a certificate given by an Association to whom the Board of Trade have issued a licence.

As regards imports of pork from the United States of America, the Board of Trade propose to issue a licence to Messrs. Harwood Banner and Son, Secretaries to the Liverpool Provision Trade Association, Limited, 24, North John Street, Liverpool, 2, who will issue certificates authorizing imports by individual firms. Communications in regard to imports from other foreign countries should be addressed to the Assistant Secretary, General Department, Board of Trade,

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Great George Street, London, S.W.1. Applications for licences should be supported by evidence of imports in previous years.

The Order in no way affects the prohibition of the importation of meat (including pork) from the Continent of Europe under the Importation of Carcasses (Prohibition) Orders made under the Diseases of Animals Acts.

Pork as defined in the Order "means the carcass of a pig or any part thereof other than the head, feet, rind, or offals, but does not include pig products in air-tight containers or bacon as defined in the Bacon (Import Regulation) Order, 1934."

The quantities to be imported in the first two quarters of this year are the averages of imports in the corresponding quarters of the years 1932, 1933 and 1934.

The Pork (Import Regulation) Order, 1935, has been published as Statutory Rules and Orders, 1935, No. 160, and copies can be purchased directly from His Majesty's Stationery Office or through any bookseller.

Imports of chilled or frozen pork into the United Kingdom from foreign countries in the first and second quarters of the years 1932, 1933 and 1934 were as follows, the principal sources of supply being the United States of America and Argentina:—

		1932	1933	1934	Average 1932-1934
		ooo cwt.	ooo cwt.	ooo cwt.	ooo cwt.
First quarter	.. ..	29.0	31.0	135.7	65.2
Second quarter	.. ..	26.9	56.0	122.2	68.4

Milk Act, 1934.—Advances amounting to £780,399 have to date been made to the Milk Marketing Board under Section 1 of this Act in respect of milk used for manufacture (excluding milk manufactured by the Board itself or milk used for cheese-making on farms). Details are given below:—

Period in which Milk was produced and manufactured	Gallons of Milk used	Products manufactured	Rate of Advance to raise price to 5d. (summer) and 6d. (winter)	Amount of Advance
1934 April—Sept....	79,342,638	{ Butter, Cheese, Milk Powder, Condensed Milk for Export and Tinned Cream	*Varying from 25 to 1.5 pence	£ s. d. 426,395 9 4
Oct., 1934— Jan., 1935...	43,774,396		*Varying from 1.0 to 2.28 pence	354,003 10 3
Totals ...	123,117,034	—	—	780,398 19 7

* According to month and product.

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A first payment of £1,105 has been made to the Board under Section 2 of the Act in respect of 187,331 gallons of milk manufactured by the Board into cheese during the months of April to July, 1934, inclusive. In connexion with this advance a certificate was issued by the Ministry in accordance with Section 2 certifying the Appropriate Manufacturing Milk Prices to have been 3½*d.* per gallon for the first three months and 3¼*d.* per gallon for July.

A further payment of £12,316 has been made to the Board under Section 3 of the Act in respect of milk manufactured into cheese on farms. The figures now stand as follows:—

Month in which Milk was produced and manufactured	Gallons of Milk Used	Cheese Milk price	Rate of advance to raise price to 5 <i>d.</i>	Amount of Advance		
1934		<i>d.</i>	<i>d.</i>	£	s.	<i>d.</i>
April ...	2,068,630	3·42	1·58	13,618	9	3
May ...	3,119,303	3·40	1·60	20,795	7	1
June ...	2,998,567	3·48	1·52	18,990	18	6
July ...	2,036,406	3·75	1·25	10,606	5	7
August ...	1,170,154	3·83	1·17	5,704	10	1
September ...	158,293	3·86	1·14	751	17	10
Totals	11,551,353	—	—	70,467	8	4

Under Section 6 of the Act, a sum of £137,499 has, by direction of the Treasury, been paid to date by the Ministry to the Government of Northern Ireland with the object of securing a standard price for milk manufactured into cream and butter at registered premises in Northern Ireland. This sum is made up as follows:—

Period of Manufacture	Gallons of Milk used for Cream and Butter	Equalization payment per gallon to raise price to 5 <i>d.</i> (summer) and 6 <i>d.</i> (winter)	Amount of Equalization payment		
1934			£	s.	<i>d.</i>
April—Sept.	12,138,670	* Varying from 1.3 to 2.2 pence	101,251	14	3
Oct.—Nov.	3,036,273	* Varying from 2.66 to 3.0 pence	36,247	14	8
Totals	15,174,943	—	137,499	8	11

* According to month.

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NOTE.—Owing to a printing error the equalization payment in the period April-October, 1934, was stated, in the table appearing on page 1214 of the March, 1935, issue of this JOURNAL, to be 1s. 3d. to 3s. 0d. per gallon. This should read 1.3d. to 3.0d. per gallon.

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4.19 pence per pound for the month of March.

Milk for Schools.—A first payment of £121,897 has been made to the Milk Marketing Board under Section 11 of the Milk Act by way of compensation in respect of the Board's expenses in supplying milk to school-children at reduced rates. Details are given below.

Month 1934	Gallons Consumed	Wholesale Price per gallon	* Loss to Board per gallon	Rate of Compensation per gal.	Amount of Exchequer Payment
		s. d.	d.	d.	£ s. d.
October	1,929,770	1 4	10	5	40,203 10 8
November	2,257,426	1 4	10	5	47,029 14 3
December	1,512,597	1 5	11	5½	34,663 13 6
Totals	5,699,793	—	—	—	121,896 18 5

* Wholesale price, plus 6d. distribution costs, minus 1s. paid by children.

Nutritional Survey.—A scheme designed to demonstrate the nutritional value of milk and to ascertain the relative merits of raw and pasteurized milk has been submitted by the Board to the Ministry for approval under Section 11 of the Act. The facilities afforded by the Milk-in-Schools Scheme will be utilized as far as possible. Milk in varying quantities will be supplied to selected groups of children, who will be periodically examined and tested over the course of a year. The Scottish Milk Marketing Board are participating in the scheme.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Act, 1934, to producers of certain classes of fat cattle in Great Britain and Northern Ireland

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amounted by March 11, 1935, to £1,779,109. These payments were in respect of 742,757 animals, the average payment per beast being £2 7s. 11d.

The Cattle Industry (Emergency Provisions) Act, 1935, which provides for a short extension (limited to three months in the first instance, with a possible further extension to six months) of the existing provisions for the payment of a subsidy to producers of fat cattle, has passed through all its Parliamentary stages and received the Royal assent.

Wheat Act, 1932.—*Sales of Home-Grown Wheat.*—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1934, to March 1, 1935, cover sales of 24,417,810 cwt. of millable wheat. The total sales to the corresponding date (March 3) last year amounted to 20,333,008 cwt.

Standard Price Committee.—Under the provisions of Section 2 (3) of the Wheat Act the "Minister" has appointed the following persons to be the Standard Price Committee:—

Sir John Field Beale, K.B.E. (*Chairman*).

Sir Harry Peat, K.B.E., M.A., F.C.A.

W. R. Smith, Esq.

The statutory duty of the Committee is to consider general economic conditions and the conditions affecting the agricultural industry, and to report to the Minister as to the desirability of making any alteration in the standard price of 10s. per cwt., as defined in the Act. If the Committee makes a recommendation to the Minister that the standard price should be altered, the Minister may make an Order substituting for the standard price of 10s. per cwt., as from August 1, 1935, such price as may be specified in the Order. Any such Order will be provisional only and will not be effective until confirmed by Parliament.

The Secretary of the Committee is Mr. W. P. Hildred, O.B.E., of the Ministry. The Committee has already held a preliminary meeting to consider procedure.

Deficiency Payments: Second Advance to Registered Growers for Cereal Year 1934-35.—The Wheat Commission has made to registered growers a second advance payment amounting approximately to £1,452,637. This advance is at the rate of 3s. per cwt. (13s. 6d. per qr.) to 44,507 growers in respect of 9,843,000 cwt. (2,187,333 qr.) of wheat

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vouched for by 62,660 wheat certificates delivered to the Commission by growers concerned during the period November 3, 1934, to January 25, 1935.

The Commission hope to make two further advances during the current cereal year on dates to be announced later.

Quota Payments.—A new Order called the Wheat (Quota Payments) No. 1 Order, 1935, was made, under Section 3 of the Wheat Act, by the Minister of Agriculture and Fisheries on March 14, 1935, after consultations with the Wheat Commission. This Order supersedes the Wheat (Quota Payments) No. 1 Order, 1934, which was made on August 9, 1934.

The new Order prescribes that the amount of the quota payment which every miller and every importer of flour shall be liable to make to the Wheat Commission in respect of each hundredweight of his output shall, as from March 17, 1935, be 21.6 pence, viz., 4s. 6d. per sack of 280 lb. Quota payments accrued due at the new rate in respect of all deliveries of flour taking place on or after March 17, 1935. Where flour or bread is exported on or after that date, the repayment of quota payment to the exporter will be made by the Wheat Commission at the new rate.

Sugar-Beet: Production of Home-Grown Sugar.—Returns made to the Ministry by the beet sugar factories operating in Great Britain show that the total quantities of beet sugar manufactured during February, 1935, and the corresponding month of 1934 were:—

1935	..	..	..	..	..	216,527 cwt.
1934	..	..	..	..	..	19,699 cwt.

The total quantities produced during each of the manufacturing campaigns up to the end of February were:—

1934-35 campaign	..	..	12,294,767 cwt.
1933-34	..	..	9,260,877 cwt.

Review of the 1934-35 Campaign.—Preliminary figures of the results of the 1934-35 beet sugar manufacturing campaign in Great Britain are now available. The crop area of 404,000 acres, the yield per acre of 10.1 tons, and the delivery of 4,095,000 tons of clean beet to the factories by 46,000 growers, all represent record figures for this country, the yield per acre being particularly notable. The sugar content of 17.1 per cent. was slightly above the average and

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must, therefore, be regarded as satisfactory in view of the high yield.

Ideal conditions in March enabled good seed beds to be prepared and seeding was carried out earlier than is usual. Where later sowings were made, these were interrupted by heavy rain at the end of April. Germination, although somewhat slow, was even, and a plant population above the average resulted. The growing season generally was marked by low rainfall, but this was so well distributed that the crop did not suffer materially except on the very light lands or when it had been late sown. When delivery to the factories commenced about the middle of September, the roots were of average size, but very rich in sugar. Open conditions prevailed throughout the harvesting season and the crop grew on without hindrance. The sugar content continued to rise and the peak was not reached until early in November, but thereafter it began to fall rapidly as the roots began to take on weight as the result of moister conditions setting in. Lifting, although delayed somewhat by the hard state of the ground, and later by the heavy rain in December, proceeded generally without interference, and deliveries of the beet to the factories were regular. The dirt tare was about 13 lb. per cwt. of beets.

The heavy supplies of beet caused the 18 factories to work the longest campaign to date, the average length being 122 days. The factory production of 615,000 tons of sugar (irrespective of polarization), 147,000 tons of molasses and 313,000 tons of dried beet pulp (74,000 tons plain and 239,000 tons molassed) all constitute the highest output the industry has attained. The production of wet pulp was 143,000 tons.

1935-36 Campaign Contracts. — The 17 factories in England and Wales have now agreed the form of contract with the National Farmers' Union. The contract is based on a fixed price of 38s. per ton of $15\frac{1}{2}$ per cent. sugar content, delivered at the factory, except for five factories (Allscott, Brigg, Kidderminster, Poppleton and Selby) where the price is 2s. per ton higher. In all cases, variations in sugar content above or below $15\frac{1}{2}$ per cent. are at the rate of 2s. 6d. for each 1 per cent.

Generally the contract terms are the same as last year. Subsidy will be limited to the produce of 375,000 acres, and penalties are to be imposed in respect of beets not grown under contract but delivered to the factory, and the grower must, if required, furnish statistical information as to his total beet acreage. As a precautionary measure against the spread of disease, particularly eelworm, beet must not be sown on the same land as last year without the consent of the factory. The appointment of growers' representatives by the National Farmers' Union now extends to all factories.

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National Mark Vegetable Schemes.—Hitherto the use of returnable containers for consigning vegetables under the National Mark has been limited to "short range" marketing, i.e., for consignments to markets at a distance of not more than 50 miles from the grower's premises. Growers have expressed the opinion that for long-range marketing returnable containers are often more economical than non-returnables; and in some instances growers have reverted to the use of returnables after having given non-returnables a trial. In the circumstances, the National Mark Vegetables Trade Committee felt that no reasonable objection could be made to the withdrawal of the 50 miles limit, especially in view of the desirability of encouraging the adoption by growers throughout the country of the standard methods of grading and packing provided by the National Mark vegetable schemes. The schemes have, therefore, been amended to enable growers who are authorized packers to use the prescribed standard returnable and non-returnable containers for marketing vegetables under the National Mark, whether to near or distant markets.

In March, 1934 the National Mark Vegetables Trade Committee recommended that the requirement of a declaration in code of the date of packing on National Mark vegetable labels should be introduced as a compulsory feature of the schemes for an experimental period of one year. Arrangements were made accordingly. A referendum of authorized packers taken recently indicated that a considerable minority was opposed to the continuance of this requirement. It has, therefore, been decided to revert to the position that existed previously, whereby the insertion of the date of packing on National Mark vegetable labels shall again be at the option of the packer.

National Mark Scheme for Cheshire Cheese.—Arrangements have been made for the grading of all Cheshire Cheese intended to bear the National Mark to be undertaken by the official grader of the Cheshire Cheese Federation. The Ministry's technical officers will exercise a general supervision.

This arrangement received the unanimous approval of a meeting of cheese manufacturers authorized in the National Mark Cheshire cheese scheme, held at Crewe on February 25. A joint Committee, consisting of four repre-

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sentatives of the Cheshire Cheese Federation, and four authorized cheese manufacturers, has been appointed. It will be one of the duties of this Committee to bring before the Federation matters that affect the interests of the manufacturers. Two authorized manufacturers have also been appointed to the Executive Committee of the Federation.

Proposed National Mark Schemes for Cheddar and Caerphilly Cheese.—Draft statutory grades for Cheddar cheese and for Caerphilly cheese were discussed at a conference between makers and the Ministry on February 7.

The introduction of a scheme for Cheddar cheese, and the setting up of a Committee in the Cheddar area to be responsible for the provision of an impartial grading service, were recommended by the makers. The makers also recommended that the proposed standardization scheme for Caerphilly cheese should be tried for one year on a self-grading basis, provided that arrangements could be made for adequate general supervision in the interest of quality control.

The National Mark and the Housewife.—The first edition (100,000) of the National Mark Recipe Book, which was published last October, was exhausted by the middle of March. A second edition of 100,000, with improved illustrations and an index, was published towards the end of March. This recipe book deals with beef, poultry and eggs; fresh, canned and bottled fruit and vegetables; and flour. Free copies may be obtained on application to the Ministry.

The Ministry also contemplates a special series of marketing leaflets designed to bring to the notice of housewives the advantages of purchasing National Mark products. The first leaflet in this series deals with National Mark beef and calls attention to the difference between the markings on National Mark home-killed beef and those now appearing on imported beef. The second, on the subject of National Mark canned fruits and vegetables, is an illustrated leaflet on art paper, which sets out briefly the convenience and quality of our home-produced fruit and vegetables in the canned form.

Home-grown Flowers.—Good progress is being made with the arrangements for the floral decoration of Government buildings in Whitehall for the King's Silver Jubilee celebrations in May. The Office of Works has decided to

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extend the scheme, and in addition to the Ministry of Health and Board of Education offices, four other buildings at least will be decorated with window boxes of growing flowers: they are Gwydyr House, Richmond Terrace, the Admiralty (Adam's Screen) and an adjoining building. The decoration of Downing Street on these lines is also under consideration, and similar schemes have been adopted in different parts of London, both by business organizations and private householders. Regent Street, for instance, is to be almost entirely decorated with flowers.

Arrangements are being made for a special visit of press representatives to Covent Garden Market during the first week in April, when the daffodil season will be at its height. The visitors will be shown over the market and will be entertained to an early breakfast by the British Flower Marketing Association.

Canada: Further Marketing Schemes.—Since the note on Canadian Marketing Schemes was published in the February issue of the JOURNAL (p. 1099) three further schemes under the Canadian Natural Products Marketing Act, 1934, have been brought into operation. These schemes, and the dates of the Orders in Council approving them, are:—

Milk Marketing Scheme of the Lower Mainland of British Columbia (Dec. 31, 1934).

Eastern Canada Potato Marketing Scheme (Jan. 17, 1935).

Western Ontario Bean Marketing Scheme (Jan. 31, 1935).

In each instance a board, representative of producers, is empowered to regulate marketing in all its phases. Provision is made for the registration of producers, the licensing of distributors, a levy in respect of marketing regulation, the rendering of returns by producers and distributors and the inspection of their records and premises.

The special features of the individual schemes are as follows:—

The British Columbia Lower Mainland Milk Marketing Scheme is applicable to milk and products made wholly or chiefly from milk (excluding ice-cream and confectionery) produced in the area of British Columbia known as the " ' T.B. Free ' Restricted Area." The scheme is supplementary to the provincial marketing scheme already set up for the regulation of the sale of milk and milk products marketed within the area of the scheme; the new scheme is applicable to all sales outside the area. The same board will administer both schemes. Grants or loans may be made to assist the provision of facilities for preserving, processing, storing, or conditioning. The board are empowered to operate a pool for equalizing returns to producers.

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The Eastern Canada Potato Marketing Scheme is applicable to all potatoes produced in certain provinces of Eastern Canada, viz.:—Prince Edward Island, New Brunswick, Nova Scotia, and Ontario. The scheme seeks to improve the marketing of potatoes by prohibiting the sale of ungraded potatoes or potatoes of inferior grades and by prohibiting shipment on consignment. It is sought to avoid undue price fluctuations by bringing supplies on to the market in an orderly manner, and to increase consumption and develop export markets by publicity and other means.

In conjunction with this scheme, new grade designations have been prescribed by regulations under the Root Vegetables Act. These grades are set out in two schedules, one of which applies to sales in Eastern Canada and the other to exports and sales in Western Canada.

The Western Ontario Bean Marketing Scheme is applicable to dry beans, excluding soya beans, produced in certain counties in the province of Ontario. It is designed mainly to regulate inter-provincial and export trade. The board are authorized to require dealers to take out bonds to guarantee their financial responsibility. The prohibition of sales on consignment is contemplated and the board may designate a "marketing agency" through which all sales shall be effected.

It is understood that schemes for the marketing of live stock have also been submitted, it being proposed to set up producers' marketing boards in each of the prairie provinces of Manitoba, Saskatchewan and Alberta.

General.—In the scheme for each of the three provinces, provision is made for exempting registered breeding stock, dairy cattle, and any live stock required by a producer for domestic consumption or by a rural retail distributor for distribution in other than a defined "urban centre." The board are empowered to impose marketing levies. The Alberta and Saskatchewan schemes each provide for the establishment under Dominion charter of a "sales agency" and the Manitoba scheme for an "export agency" to act as a central selling agency. Any such agency may act on behalf of the boards of one or more provinces or regulated areas, and may distribute the proceeds of sales, after deduction of its expenses, on the basis of the volume consigned by each regulated area.

The Alberta and Saskatchewan Schemes are each applicable, apart from the above-mentioned exemptions, to cattle, sheep and pigs, and products thereof, produced or marketed within the respective provinces. Provision is made for the registration of all persons engaged in the production or marketing of the regulated product and for the licensing of distributors and packers. Each registered producer must deliver his regulated products to the "sales agency" in accordance with the regulations of the board. All regulated products are to be graded and classified in accordance with the Government regulations for the time being in force and must be offered and sold on such basis. The board may conduct a pool for the equalization of returns by grade or classification.

The Manitoba Scheme is applicable, apart from the above-mentioned exemptions, to cattle, sheep, and pigs produced or marketed in the province. Provision is made for the registration of all persons engaged in the production of the regulated product. The board may require that the regulated product be sold only through public markets or live stock exchange agencies. They may require that all live stock destined for sale outside the province be consigned to the "export agency" and may equalize the returns therefrom on a pro-rata basis.

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New Zealand: Agriculture (Emergency Powers) Act, 1934.—This measure conforms in the main with the Bill, a note on which appeared in the JOURNAL for January, 1935 (p. 986). The Act, however, provides that "The Executive Commission of Agriculture," which may be called upon to exercise very wide powers, shall consist of the Minister of Agriculture (who shall be Chairman) in addition to the three members appointed by the Governor-General in Council for a period of five years. Further, it is provided that any powers vested in any of the existing commodity boards may only be transferred to the Commission after consultation between the Commission and the particular board affected. These boards, which are specified in the Act, are concerned with the marketing of meat, dairy produce, fruit, honey and poultry products.

Irish Free State: Milk and Dairies Bill.—The object of this Bill, which would replace a number of former enactments concerned with milk and the public health, is to make further and better provision in relation to the production and sale of milk, with the object of improving the standards of quality and freedom from infection. Important features are the provision for the registration of dairymen and dairies, and the prohibition of the sale of milk by unregistered dairymen or on unregistered premises.

APRIL ON THE FARM

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PREVIOUS writers of Monthly Notes have been situated in the South, and at the beginning of a series from a western district it may be well to indicate briefly the agricultural features of the area in which they are written.* In the main, they are not peculiar to Wales, but are shared with the south-west and north-west of England and with the west of Scotland. The presence of the mountain masses, and the proximity of the western seaboard result in a wet, mild climate, which is the main factor responsible for the prevalence of a pastoral rather than an arable type of farming. The discouraging effect of such a climate on the growth of corn is well appreciated at harvest time, but this is by no means the whole story.

By the time these notes appear, a great deal of the corn crop will have been sown, not only in the east of England, but also in the east of Scotland. In the West, at the time of writing, the land is so sodden that it seems very unlikely that even a start will have been made. Rainfall is usually heavy from October to March, and very often the land is not dry enough for sowing corn until the second week in April. The past winter has not been abnormally wet, but the rainfall near Bangor, which is one of the driest parts of Caernarvonshire, has been nearly 22 in. in the five months October to February. Measurable quantities of rain have fallen on 113 out of 151 days. Frost is rarely keen enough to temper heavy soils, and during the past winter was only recorded in the screen on three occasions, the maximum being 2 degrees of frost. The farms are mostly too small and the soils too stony for the economical use of tractors, so that it is only possible on a few farms to employ this means of overtaking arrears of work in a favourable spell.

On the other hand, conditions favour the growth of grass; severe droughts are rare, water supplies for stock are

* These may be studied very conveniently in detail in an Agricultural Atlas such as that issued by the Agricultural Economics Research Institute, Oxford.

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usually ample, and a certain amount of growth takes place all the winter. The small "family" type of farm is probably the one best suited to the rearing of young stock. Not only the farmer, but his wife and family take a close interest in the welfare of each individual animal. The plough is regarded more as a means of maintaining the productivity of the grass land than as a way of securing a direct income. Instead of the usual separation of the farm into arable and grass, the rotation includes a ley of at least three or four years, and on many farms there is no restriction regarding the ploughing of any field. When the grass becomes weedy, or shows signs of falling off in quality of herbage, it is ploughed up and put through a short course of cropping as a preliminary to re-seeding. In recent years, the lack of demand for oats, almost the only corn crop grown, and the desire to reduce labour costs has led to a great lengthening of the grass ley.

Not only does the wet climate favour the formation of grass land, but it is an important asset in the securing of good corn crops afterwards. In a dry district, it would be risky to plough a grass field in late winter and sow immediately with a corn crop. Wireworms are usually blamed for the failures that often result, but probably in most cases the real cause is the drying out of the soil. Owing to the lack of effective contact between the two layers moisture cannot rise sufficiently quickly to make good the deficiency. It is perhaps not too late to emphasize the importance, even in a wet district, of thorough consolidation of the soil when old grass or long leys has been ploughed up. One of the most effective ways of securing this is the treading by horses during the harrowing preparatory to sowing corn. Hence the custom in some districts of insisting on a certain number of harrowings "whether the land needs it or not." At a Ploughing Match a week or two ago, among the points noted in one of the usual discussions regarding the utility of such institutions, was a remark overheard that in the previous year by far the best corn was on a bit of the worst ploughing. This may very well have been the case in the dry summer of 1934. The worse the ploughing from the "match" point of view, the more harrowing it would probably require to secure a good seed bed, and consequently the greater the consolidation. The late sowing often perforce adopted in a wet district leads to many variations from what may be regarded as

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normal practice. Particularly after old grass, a small dressing of superphosphate will help to ripen the corn and reduce the preponderance of straw over grain. Another measure designed to secure the same objects is to give a far heavier seeding than an East Coast farmer would believe possible. It is not long ago that the usual rate of seeding for oats in many parts of Wales was 8 bushels per acre. In those days there was no Seeds Act, and probably much of the seed corn had poor germinating capacity. Even now a seeding of 6 bushels is very common, and in a late season it is undoubtedly required where some of the large-grained oats are sown. Many of them have low tillering capacity, and, in any case, when sown towards the end of April, it is desirable that the plants should grow straight on and not lose time by throwing out tillers.

Oats are not usually regarded as a good nurse crop for "seeds," but on farms where no other corn crop is grown it is a case of "Hobson's choice." Although the oats are sown thickly, it is rarely that a failure of seeds occurs. This is probably due mainly to moisture conditions, but the fact that seeds are almost invariably sown as soon as possible after the oats, and not, as in many districts, after the corn is up, doubtless helps to give them a good start. The sowing of catch crops in the ordinary way after harvest is practically out of the question, but a very valuable addition to the food supply in autumn is often obtained by sowing Italian ryegrass at the rate of 15 to 20 lb. per acre along with any corn crop that is not to be seeded down. The autumns are usually mild and open, the seed is sown at little expense immediately behind the corn drill, and ryegrass, unlike clover, rarely causes any additional trouble in harvesting the corn.

In these days no one will need to be reminded of the importance of live stock in British farming generally, and its supreme interest in the western pastoral areas will be well realized. These constitute the main cattle rearing districts in Great Britain, and include some of the areas most thickly populated with sheep. Even in Wales, however, where the sheep population is particularly large, cattle rearing may be said to constitute the backbone of the traditional system of farming. On the typical small farm, the sale of store cattle and butter constitutes a very large part of the revenue of the farm. The disastrous prices of store cattle and butter have hit this industry very hard, and

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no one will be surprised that farmers who hitherto have never sold milk are now supplying the factories that are springing up in many districts. Such a state of affairs has very obvious dangers, both to the Milk Marketing Scheme and to the future supply of store cattle.

On mountain farms throughout Britain sheep have been almost the only source of income for the last century at least. During the last 20 or 30 years, the desire to reduce labour costs, and the development of the fat lamb industry has led to a great invasion of the lowlands by sheep from the hills.

The temporary leys of the western districts are excellently suited to fat lamb production, and the mild climate makes it possible to keep a small, hardy type of sheep on grass throughout the winter with little or no expenditure on purchased feeding stuffs. It is also possible to lamb early, and thus have a considerable proportion for the Easter and Whitsun markets, when good prices may be expected. In many districts near the sea coast where snow is rare, lambing usually starts at the beginning of January, and by now is practically finished in the "flying" flocks maintained for fat lamb production.

Ewes have come through the winter very well, and, although they have often had "wet backs" there has been an unusually good supply of grass, so that they have lambed in excellent condition with plenty of milk. As far as can be ascertained, the crop of lambs is above the average and well above that of last year. The difference in the two seasons may well reflect the supply of grass in the previous autumn. In 1933, the drought continued in all districts until late in the year. That of 1934 broke in August. At Bangor, the rainfall in that month was 3.68 in. and in September 4.07 in. as compared with 1.65 in. and 1.48 in. respectively in 1933. In mountain flocks, lambing rarely begins before the end of March. Heavy snow on high ground in April is by no means uncommon, but it is an immense advantage to have the ewes in good condition. Young ewes in low condition have very little milk, and will desert a weakly lamb that is slow in getting on to its legs. In some mountain districts the question of giving ewes hay in bad weather during winter is hotly debated, but in Wales this is hardly ever practised, and the majority of Welsh ewes can only be induced by fairly long starvation to eat hay. In true mountain flocks, the percentage

of lambs is seldom much above 85 per cent. (calculated on the basis of ewes put to the ram in autumn). Few twins are born or desired, and, allowing for barren ewes, losses during the winter and at lambing, 100 per cent. is very rarely obtained. The same ewes brought down to the lowland will give up to 130 per cent.

Root Crops.—The mangold crop is sown in April, or the first half of May; growers are divided on the question of early sowing. Some sow early in April, preferring a fairly large proportion of bolters rather than the risk of the drier seed bed that may result from late sowing. A higher proportion of bolters is not, however, the only disadvantage of early sowing. The mangold "seed," owing to its thick covering, is slow in germinating, and a cold, wet period after sowing results in a poor stand. Again, on the heavier classes of soil, a hard "skin" is apt to form on the surface of the soil if much rain, followed by a dry period, occurs between sowing and the appearance of the crop above ground.

Varieties of mangold differ in their susceptibility to bolting. From observations at the College Farm, Aber, it appears that the deeper-coloured types, like Long Red, are more subject to bolting than those of a lighter colour. In a trial carried out in triplicate in 1929, it was observed that, if the six varieties were placed in order of depth of colour, the order was approximately that in which they occurred if arranged according to the number of bolters. Ideal, however, which has only been grown at this centre for two seasons, appears to be an exception; this variety, which resembles sugar beet in appearance, seems to be susceptible to bolting in spite of the light colour of its root. It must be added, nevertheless, that in this variety there is a tinge of orange colour towards the base of the foliage.

The amount of information available on the selection of a suitable variety makes it unnecessary to discuss this point. It is sufficient to emphasize that there are few crops in which yield is more influenced by variety; mangolds and swedes offer a great contrast in this respect.

Most of the early potatoes, and a fair proportion of the earlier-planted later varieties, will appear above ground this month. Thorough destruction of weeds before this occurs facilitates subsequent cleaning operations. Weeds appearing on the ridges are destroyed by the saddle-back harrow, or by the chain harrow, those at the bottom being generally destroyed by the horse hoe. It is well not to delay this operation too long, since weeds quickly establish a firm foothold on the loose soil of the ridges.

Pastures.—The turning out to pasture of the indoor stock is eagerly awaited, particularly where last year's hay crop was light; in this area, however, there are very few instances of shortage of hay. It is only in very few cases that cattle in North Wales are turned out to grass in April. Even the earlier pastures are generally bare until May, owing to the heavy demands of the ewes and lambs; it is only when the more rapid growth takes place in May that sufficient food becomes available for the cattle. The practice of stocking the farm with ewes to the utmost winter capacity of the pastures has the disadvantage of prolonging the winter feeding period of the cattle.

Experienced stockmen know the care that is required when cattle are turned out to grass in spring. Buyers of store cattle realize the value of a good coat of hair when seeking cattle for the early stocking of pastures; the expression "hair is worth as much as flesh" is often heard. If cattle are to be turned out early, they must have been wintered in open yards, thus being prepared for sleeping on

PRICES OF ARTIFICIAL MANURES

wet ground in cold weather. Dairy cows and other cattle that are wintered completely indoors must be brought in at night for the first few days after they are put out if the weather becomes cold and wet. A set-back at the beginning of the grazing period means that cattle fail to get full advantage from pastures when these are at their maximum nutritive value. Even in weather not regarded as very cold young cattle lose weight for the first few weeks after they are turned out, and it is very probable that the cold nights have a lot to do with this. The relative importance of weather and of the sudden change of diet as contributory causes of this set-back form an important problem, because improvements in pasture management lose much of their force if stock are managed in such a way that they fail to utilize the grass to the best advantage when it is at the height of its value.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended March 20				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20-6%) ..	7 5d	7 5d	7 5d	7 5d	7 0
Calcium cyanamide (N. 20-6%) ..	7 4s	7 4s	7 4s	7 4s	7 0
Kainit (Pot. 14%) ..	3 0	2 14	2 12	2 14g	3 10
Potash salts (Pot. 30%) ..	4 11	4 6	4 4	4 6g	2 10
" " (Pot. 20%) ..	3 12	3 6	3 3	3 6g	3 4
Muriate of potash (Pot. 50%) ..	7 4	6 16	6 12	6 16g	2 9
Sulphate " (Pot. 48%) ..	8 3	7 18	7 12	7 18g	3 3
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 10c	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16b	3 6
" (S.P.A. 13½%) ..	2 15	2 11	2 15f	2 12b	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 15f	6 7	..
Steamed bone-flour (N. 4½%, P.A. 27½-29½%) ..	5 12	5 12	5 10f	5 10	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 8-ton lots, net cash for prompt delivery f.o.r. in towns named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

‡ Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

§ Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 85% through standard sieve.

¶ For lots of 4 tons and under 6 tons the price is 12s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 20s. extra.

|| Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 20s. per ton extra, for lots of 20 cwt. and under 1 ton 15s. extra, and for lots of less than 20 cwt. but not less than 2 cwt., 20s. extra.

||| Prices shown are f.o.r. Widnes.

§ Prices shown are f.o.r. northern rail; southern rail, 2s. 6d. extra.

‡ Prices shown are f.o.r. northern rail; southern rail, 2s. 6d. extra.

NOTES ON MANURING

F. RAYNS, M.A., and E. T. SYKES, M.A.,
Norfolk Agricultural Station.

Tendencies in Manuring.—Perhaps the most important of the recent developments in the fertilizing industry that directly affect the farmer's practice are the improvements effected in the condition of mixed fertilizers, and the concentration and granulation of some of the "straight" and compound manures. There has also been a price inducement to use the purer forms of fertilizers. The older types rarely contained more than one element acting as a manure; in the recent compounds, potash and nitrogen, or ammonia and phosphates, or even ammonia and nitrogen, are probably combined. Some criticism of this concentration of the fertilizing ingredients into one compound is possible, for it assumes that plants only require nitrogen, phosphate, potash and lime, and ignores the possible beneficial influences of the less prominent ingredients of the older manures, such as magnesium, sodium or chlorine, all of which on some soils and for some crops may be very important. These instances, however, are exceptional, and there is little material criticism to offer to the tendency to concentrate manures; the products usually act according to their analyses and concentration makes them more convenient to use.

Farming, however, is a complicated business, and there is less time now for the personal supervision of every farming detail, so that when the opportunity arises for delegating some of the detail there is a growing tendency to take it. The manufacture of compound cakes and fertilizers is usually scientifically directed and the products are generally reliable. That the farmer in using them must pay a little more than would be necessary if he mixed at home, is, of course, inevitable as a contribution to the cost of preparation, advertising, salesmanship, and overhead charges that must be borne by modern industrial firms whose business is allied to the soil. Alternatively, it may be the price he pays for his own ignorance of the science of his practice.

NOTES ON MANURING

Manures, however, must be mixed with accuracy and efficiency, or they may do more harm than good. At the moment it still pays to mix at home, unless a high value is placed on the convenience and the fool-proof nature of the merchant's compound. The margin between the reputable compound and the equivalent home mixture has of late been considerably narrowed, and it may not be long before the agricultural adviser has only to decide for those seeking his advice between a number of compounds.

In the meantime, it is still possible to buy the overpriced, but otherwise genuine compound manure, and the one with subtle but less obvious virtues to commend it. Unfortunately, both kinds find their most willing purchasers in the small men, who are often offered credit terms that are irresistible to the man short of cash and lacking the confidence of his bank manager—if he has one.

Mangolds.—In some parts of England interest in the mangold crop has declined as the sugar-beet acreage has extended; in other parts more concerned with dairy cows than with beet factories, the mangold has resisted the beet challenge and its cultivation has not been impeded. Now that the beet acreage has become more restricted it seems likely that more interest will be taken in mangolds.

A calculation made at the Rothamsted Experimental Station showed that an acre of mangolds produces more sugar than an acre of sugar-beet. The comparison was made between mangolds and sugar-beet as generally cultivated. How much more favourable would be the position of the mangold as a contribution to the supply of stock feed, if it was cultivated as intensively as sugar-beet?

The principles of the manuring of mangolds have been worked out on the classical continuous plots at Rothamsted. Farmyard manure generally benefits the crop, and of the artificial fertilizers those that contain nitrogen are the most important; responses to potash and to phosphate are much smaller. Barnfield at Rothamsted is a heavy field, and the experiments have been carried on since 1876, and while they must by this time truly indicate the behaviour of the mangold to manures, the results have not been obtained in rotation farming and therefore should not be literally translated into practice. If that were done the application of farmyard manure and a heavy dressing of nitrate of soda would be the general prescription for mangolds. Some-

NOTES ON MANURING

times scientists and advisers complain that farmers have not used the results of manuring experiments, but the traditional method of manuring mangolds in some eastern counties—farmyard manure, some nitrogen, no phosphates and 5 cwt. per acre of kainite on the light lands—follows closely the results of Barnfield at Rothamsted, and is still firmly established amongst the older farmers.

There is an unconscious reference to these practices in the report of the barley-manuring experiments carried out in Norfolk under the Institute of Brewing Research Scheme; special mention is made of the response to phosphates obtained only at the Norfolk centres; no doubt some of these barley crops followed mangolds unmanured with phosphates. In that case at least the phosphates, if they were not required by the mangolds were wanted by the barley, and we are back once more emphasizing the necessity in manuring of considering the soil rather more than the crop, and of manuring the rotation as a whole rather than the crops as a series of units. The root shift is the place to make good the manurial deficiencies for the rest of the rotation, and a complete mixture of artificials is the best recommendation for mangolds. In manuring thus we need not neglect the peculiarities of the crop, and can generally use up to 3 cwt. of nitrate of soda with profit, for nitrate of soda is probably the most effective manure for mangolds. As with sugar-beet, there is no need to top dress; the nitrogenous manures should be put on before the seed is drilled. If we turn to the niceties of mangold manuring there is evidence that salt is a useful manure; that the crude forms of potash are more valuable than the pure forms; and that salt is not so effective when used with nitrate of soda as when used with sulphate of ammonia. This last point was well illustrated in trials carried out over thirty years ago by the Norfolk Chamber of Agriculture.

An application of 3 cwt. per acre of a high-grade super-phosphate, 2 cwt. of 30 per cent. potash salts, and 2-3 cwt. of sulphate of ammonia or nitrate of soda, may probably safely be recommended for use with farmyard manure. Some variation in the quantity and kind of phosphates and potash will be necessary according to the soil and price, as determined by the underlying principles previously mentioned in these notes.

Top Dressing Sugar-Beet.—By the time these notes appear fertilizers will have been applied for many sugar-

NOTES ON MANURING

beet crops. The practice of mixing all the artificials and putting them on in one dressing is becoming more widespread.

In the early days of sugar-beet cultivation in England it was customary to apply the nitrogenous manures partly during the seed-bed cultivations and partly by top dressing just after singling and sometimes even later. Experiments carried out in Norfolk showed that top dressing with nitrate of soda or sulphate of ammonia had no better effect than seed-bed applications of the same manures. The nitrate of soda results were reported in this JOURNAL for May, 1931, and even when the spring rainfall was above the normal, the increased yields from seed-bed applications of nitrate of soda were equal to those from an equal quantity (3 cwt. per acre) applied in two or more applications after germination.

Obviously, to be able to dispense with top dressing reduces labour costs. The other advantages of seed-bed application may be summarized thus: the sugar content is not seriously reduced as it may be by late top dressing, especially when a late-maturing variety is sown; a readily available supply of nitrogen is always present for the young plants from the seedling stage onwards; the risk of losing plants during top dressing is avoided as the manure cannot fall on to the leaves and scorch them; the destruction of plants by the trampling of horses or the wheels of the manure drill is avoided; the distribution of the manure will be more even, for drills usually sow large quantities of manure the most evenly; and in general seed-bed application is much more convenient. On the other hand, seed-bed application has disadvantages; if it helps the beet plant in the early stages it may also help the weeds and make more difficult the singling and cleaning operations; if the plant fails repeatedly, as it may from the attacks of wireworm or other pests, there will probably be too much nitrogen present for the swedes or other late crop, which may have to be sown to cover the land, and 15s. per acre may easily be wasted.

These statements are to some extent influenced by the time of drilling, the variety in use, and the type of land. In general, however, it may be said that the only conditions justifying top dressing in the eastern half of England are when sowing is undertaken quite early on light land; even then seed-bed applications are just as satisfactory except

NOTES ON MANURING

in wet seasons. In wet districts there may be more justification for top dressings, but in any event early-sown sugar-beet should never be top dressed later than the time of singling, and a sugar-beet crop sown, say, after the end of April should not be top dressed unless it is severely attacked by insect pests; all the manure should otherwise be put on the seed-bed.

Manuring and Beet Tops.—Of the crops leaving behind a by-product for stock feeding, sugar-beet is probably the most important, for the weight of tops left after the roots have been harvested is commonly between 5 and 10 tons per acre. The extent to which manuring may influence the yield of tops, is not, however, generally recognized, and now that the direct profit from beet growing has been so reduced on the poorer soils, as to be nearly negligible, the importance of a high yield of tops has become more pronounced. On the light arable sheep farms it is not too much to say that sheep prices and beet tops will to a great extent determine the future of the cultivation of sugar-beet.

The nitrogenous manures on normal soils influence the yield of tops most of all, and even in years when artificials have little or no effect on the roots, the tops are usually increased in weight. This point was demonstrated in 1926 and 1927 at Sprowston, in trials with nitrate of soda and nitrate of lime; the results showed that an increase in the nitrogenous manure up to 4 cwt. per acre produces over $2\frac{1}{2}$ tons more tops, and each increment of manure gave approximately 13 cwt. more leaves and crowns. It is often unwise to attempt to place a cash value on beet tops, there are so many factors that can render the valuation invalid; but if it be assumed that one-third of the tops are wasted, and that the value for feeding purposes is 6s. per ton, then there will be recovered an extra 3s. for every cwt. of nitrogenous manure, or if 3 cwt. are used, the extra return is nearly 10s. per acre. Reference was made in these notes last month to trials in which the use of 3 cwt. of a nitrogenous manure was amply justified by the extra yield of sugar per acre; its use is further justified (with adequate lime, phosphate and potash, of course) by the greater yield of stock food it produces.

NOTES ON FEEDING

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Feeding Ewes and Lambs.—In most of the literature on feeding of ewes and lambs in this country (there isn't much) it is assumed that the flock is folded or fed on hay and green crops. In actual practice, however, our flocks to-day are fed very largely on grass. It is, therefore, of interest to examine accepted feeding standards in the light of existing practice.

The late Professor T. B. Wood, it may be recalled, put the milk output of a 160-lb. ewe at 3 gal. per week, and calculated her total requirements at 21 lb. starch equivalent and 3.6 lb. digestible protein per week. Professor J. A. S. Watson has since adduced evidence to show that the *maintenance* requirements assumed in this calculation are too high. It appears to us that the requirements for *production* are considerably too low. If a cow producing milk of 16.6 per cent. starch equivalent requires 2.25 lb. starch equivalent per gallon, simple arithmetic would suggest that ewe's milk of starch equivalent 26.7 per cent. calls for a ration containing at least 3.6 lb. starch equivalent per gallon, not 3 lb. as suggested by Wood; in all probability 4 lb. per gallon would be required.

For our present purposes, therefore, we prefer to adhere to Wood's standards. Adopting these, what supplementary feed is necessary for milking ewes?

The Suckling Ewe.—The composition of spring grass (i.e., March and April) may with safety be put at 14 per cent. starch equivalent, containing 3.5 per cent. digestible protein. As far as we are aware there are no recorded observations on the quantity of grass that a ewe will consume; but judging by the records of Professor Stapledon and Dr. Martin Jones on the grazing capacity of shearlings, we may assume that the appetite of a 160-lb. ewe is in the neighbourhood of 104 lb. fresh grass containing 24 lb. dry matter per week.

NOTES ON FEEDING

On this basis the calculation for a suckling ewe becomes :—

	<i>Dry Matter.</i>	<i>Starch Equivalent.</i>	<i>Digestible Protein.</i>
Required ..	28	21	3.6
Supplied in Grass ..	24	14.6	3.6
Difference ..	4	6.4	—

There seems, therefore, no need for protein concentrates for the ewe herself; any concentrate given should apparently be of a starchy nature; the ewe at grass, in fact, resembles the dairy cow in her requirements.

The Lamb.—The position of the lamb is entirely different, for it consumes varying quantities of milk together with gradually increasing quantities of grass. Judging by the results of the Wiltshire lamb trials an average grass-lamb grows for the first six weeks at about 0.75 lb. per day, and for the next three months at about 0.4 lb. per day. At 40 lb. live weight it requires (according to Wood's tables) 13 lb. dry matter, 5.5 lb. starch equivalent and 1.1 lb. digestible protein per week.

It is plain that these requirements could not be met by milk alone, for 2 gal. milk would supply all the starch equivalent and digestible protein, but less than half the dry matter required. Nor would a diet of milk and spring grass be suitable—it would be necessary for the lamb to eat nearly 40 lb. of grass per week, to obtain the necessary dry matter. In all probability its appetite for grass can be put at something like 5 or 10 lb. per week.

Assuming that it gets 1 gal. of milk per week from its dam, the calculation of its supplementary requirements becomes :—

	<i>Dry Matter</i>	<i>Starch Equivalent.</i>	<i>Digestible Protein.</i>
1 gal. milk ..	2.5	2.67	.67
10 lb. grass ..	2.3	1.4	.35
Total natural food ..	4.8	4.07	1.02
Required as supplement	8.2	1.43	.08
	13.0	5.5	1.10

As with the ewe, therefore, a farinaceous supplement seems to be indicated. It is, indeed, necessary to suppose that the lamb gets an insignificant quantity of milk in order to justify the use of the protein-rich rations normally recommended in the literature of shepherding.

Maize.—Imports of maize last year reached the huge total of 3 million tons, or about one-third of the world's export-

NOTES ON FEEDING

able surplus. Something like four-fifths of this supply came as usual from the Argentine, though that country is a small producer by comparison with the United States. Two factors contributed to the Argentine's dominance—the popularity of the round yellow variety chiefly grown in that country, and the remarkable efficiency of her shipping facilities. It is said to cost less to transport grain from Rosario to Liverpool than to move it from Chicago to New York.

If prices are any criterion, the chief competitor with maize is not the grain that most nearly resembles it in composition—barley—but wheat. At all events the general trends of maize and wheat prices are very similar for many years past, while the index charts of maize and barley differ markedly. The index figure for barley (base years 1911-13) remained almost consistently below that for maize between 1920 and 1930; but from 1931 onwards the maize has almost consistently been the lower. The volume of maize imports fluctuated around 2 million tons from pre-War years until 1930, since which year the increase has been very rapid. There is no sign of any permanent increase in barley imports, and price fluctuations appear to be a direct result of fluctuating harvests at home and in the exporting countries, especially Russia and the Danubian countries. Our own production is of course only one-half that of pre-War years.

Since there is no immediate sign of a decline in maize imports, prices of that grain seem likely to remain low.

At £4 10s. per ton, maize is a very cheap source of carbohydrate, and an awkward obstacle in the way of schemes for industrial utilization of potatoes. Allowing for differences in transportability, potatoes with a starch content of 20 per cent. can scarcely be valued at more than £1 per ton.

It is probable that the recent vast increase in imports has been absorbed mainly by the poultry industry, for a minor revolution over maize has occurred in poultry-keeping circles. Before the War no self-respecting poultry-keeper would look at it; it was supposed to lead to internal fat and "liver-rot"; it was a popular vehicle for sectarian scorn, for "only farmers used maize." A note-book of 1910, still in the possession of one of us, describes its potentialities in terms of fearful mystery, but the exigencies of War left poultry keepers little choice; and in post-War years Lancastrian practice led to more rational general views. It is used to-day to the extent of 50 per cent. by weight in grain mixtures,

NOTES ON FEEDING

at least 25 per cent. in many laying mashies, and as a minor constituent even in rearing mashies. As grain it is used almost invariably in kibbled form.

Scientific workers, accustomed to adjusting theories to fit the declared experience of practical men are thus provided with the interesting task of interpreting diametrically opposed pre-War and post-War views.

Symbiosis.—The word probably recalls to the average person's mind the tale of bacteria and the legumes. That of course is an incidental of systematized education, standard text-books and examinations. An example cited in a text-book becomes part of the stock of common knowledge to the exclusion of variants, be they never so numerous and interesting. Out of every ten minds infected with *B. radicola* how many would react to the mycorrhiza test?

Pursuit of the protein problem brings public interest to bear on another symbiotic relationship, known of indeed for a long time, but hitherto somewhat neglected—that of the paunch bacteria and ruminants. The amino-acids of the animal body are for the most part synthesized from similar compounds supplied in the food; hence the necessity for a proper balance among the proteins supplied in rations. Under conditions of protein deficiency, cattle can build up body proteins from inorganic compounds. In a recent investigation at Breslau nearly 1 lb. per day of digestible protein in a cow's ration was replaced by an equal weight of ammonium bicarbonate, for 3 months without adverse effects on milk yield; even higher quantities of the ammonium salt were employed on occasion. It is believed that the nitrogen in the salt is in the first place metabolized by rumen bacteria, and reaches the animal through the subsequent digestion of the bacteria.

The discovery is of immediate agricultural interest chiefly by reason of its bearing on the protein value of mangolds and other natural foods known to be rich in inorganic nitrogenous compounds. It is not likely materially to influence practice in this country at present, since proteins are so cheap.

It may, however, influence Continental practice; for economic nationalism appears to be leading German science along strange paths in animal nutrition.

NOTES ON FEEDING

Meantime the great effort to reduce food production on the other side of the Atlantic continues. The epic of the surpluses is told with surpassing skill and succinctness in the current report by the United States Secretary of Agriculture (in 30 years' browsing on agricultural literature we have encountered no such pregnant prose as his).

Philosophers from Solomon onwards have exhorted us to emulate the ant and bee. More to the purpose would it be to-day to emulate the symbiotic bacteria; for truly there is little enough in international affairs to suggest cohabitation of this world for mutual benefit—though clarion voices rise in every land demanding saner economics.

NOTES ON FEEDING

Farm Values. —The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6.2	6 11
Maize	78	7.6	4 12
Decorticated ground-nut cake	73	41.3	6 18
„ cottonseed cake	68	34.7	7 10

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1.52 shillings, and per unit protein equivalent, 1.24 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The “ food values,” which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

FARM VALUES.

Crop	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	6 1
Oats	60	7.6	5 1
Barley	71	6.2	5 16
Potatoes	18	0.8	1 8
Swedes	7	0.7	0 12
Mangolds	7	0.4	0 11
Beans	66	19.7	6 5
Good meadow hay	37	4.6	3 2
Good oat straw	20	0.9	1 12
Good clover hay	38	7.0	3 6
Vetch and oat silage	13	1.6	1 2
Barley straw	23	0.7	1 16
Wheat straw	13	0.1	1 0
Bean straw	23	1.7	1 17

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Wheat, British	£ 4 13	£ 0 8	£ 4 5	72	s. d. 1 2	d. 0.62	% 9.6
Barley, British feeding	5 15	0 7	5 8	71	1 6	0.80	6.2
" Canadian, No. 3 Western ..	7 7	0 7	7 0	71	2 0	1.07	6.2
" Persian	5 10½	0 7	5 3	71	1 5	0.76	6.2
" Polish	6 15	0 7	6 8	71	1 10	1.08	6.2
Oats, English, white	7 0	0 8	6 12	60	2 2	1.16	7.6
" " black and grey	7 0	0 8	6 12	60	2 2	1.16	7.6
" Scotch, white	7 12	0 8	7 4	60	2 5	1.29	7.6
" Canadian, No. 2 Western ..	8 3	0 8	7 15	60	2 7	1.38	7.6
" " mixed feed	6 18	0 8	6 10	60	2 2	1.16	7.6
" Chilian	7 13½	0 8	7 5	60	2 5	1.20	7.6
Maize, Argentine	4 12	0 6	4 6	78	1 1	0.58	7.6
" Danubian, Gal. Fox	4 15½	0 6	4 9	78	1 2	0.62	7.6
" South African, No. 2 White Flat	5 3½	0 6	4 17	78	1 3	0.67	7.6
" South African, No. 6 Yellow Round	5 5½	0 6	4 19	78	1 3	0.67	7.6
Beans, English, winter	5 15½	0 16	4 19	66	1 6	0.80	10.7
Peas, English, blue	8 0½	0 14	7 6	69	2 1	1.12	18.1
" Japanese	13 17½	0 14	13 3	69	3 10	2.05	18.1
Dari	7 2½	0 7	6 15	74	1 10	0.98	7.2
Milling offals—Bran, British " broad	6 0	0 14	5 6	43	2 6	1.34	9.9
Middlings, fine, imported ..	6 12	0 14	5 18	43	2 9	1.47	10
Weatings{ Superfine{	5 17	0 12	5 5	69	1 6	0.80	12.1
" " "	5 10	0 13	4 17	56	1 9	0.94	10.7
Pollards, imported	6 2	0 12	5 10	69	1 7	0.85	12.1
Meal, barley	5 10	0 13	4 17	50	1 11	1.03	11
" " grade II	7 12	0 7	7 5	71	2 1	1.12	6.2
" maize	6 17	0 7	6 10	71	1 10	0.98	6.2
" " South African	5 7	0 6	5 1	78	1 4	0.71	7.6
" " germ	5 2	0 6	4 16	78	1 3	0.67	7.6
" locust bean	5 10	0 10	5 0	79	1 3	0.67	8.5
" bean	7 10	0 5	7 5	71	2 1	1.12	3.6
" fish, white	8 5	0 16	7 9	66	2 3	1.21	19.7
Maize, cooked, flaked	14 15	2 0	12 15	59	4 4	2.32	53
" " gluten feed	5 15	0 6	5 9	84	1 4	0.71	9.2
Linseed cake, English, 12% oil ..	6 0	0 12	5 8	76	1 5	0.76	19.2
" " " 9% "	8 12	0 19	7 13	74	2 1	1.12	24.6
" " " 8% "	8 5	0 19	7 6	74	2 0	1.07	24.6
" " " 8% "	8 0	0 19	7 1	74	1 11	1.03	24.6
" " " 6% "	8 7½	0 19	7 8	74	2 0	1.07	24.6
Soya-bean cake, 54% oil	7 17½	1 6	6 11	69	1 11	1.03	36.9
Cottonseed cake—English, Egypt- tian seed, 41% oil	5 0	0 16	4 4	42	2 0	1.07	17.3
" " Egyptian, 41% "	4 7	0 16	3 11	42	1 8	0.89	17.3
" " decorticated, 7% " ..	7 10½	1 6	6 4	68	1 10	0.98	34.7
" meal, decorticated, 7% " ..	7 12½	1 6	6 6	68	1 10	0.98	34.7
Coconut cake, 6% oil	6 12	0 16	5 16	77	1 6	0.80	16.4
Ground-nut cake, 6.7% oil	6 5*	0 17	5 8	57	1 11	1.03	27.3
" " decor., 6.7% oil	7 5	1 6	5 19	73	1 8	0.89	41.3
" " imported, decorticated, 6.7% oil ..	6 12	1 6	5 6	73	1 5	0.76	41.3
Palm-kernel cake, 41-54% oil ..	6 10½	0 11	5 19	73	1 8	0.89	16.9
" " meal, 41% oil	6 10½	0 11	5 19	73	1 8	0.89	16.9
" " meal, 1.2% oil	5 17	0 11	5 6	71	1 6	0.80	16.5
Feeding treacle	5 0	0 7	4 13	51	1 10	0.98	2.7
Brewers' grains, dried ale	5 17	0 10	5 7	48	2 3	1.21	12.5
" " porter	5 10	0 10	5 0	48	2 1	1.12	12.5
Dried sugar-beet pulp (a)	5 15	0 5	5 10	66	1 8	0.89	5.2

(a) Carriage paid in 5 ton lots. * At Bristol ‡ At Hull. † At Liverpool.

† In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of February, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £6.10 per ton, then since its manurial value is 19.2 per ton as shown above, the cost of food value per ton is £6.22. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 8s. 2d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1s. 10d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N, 6s. 11d.; P₂O₅, 2s. 1d.; K₂O, 2s. 11d.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE February general index number of the prices of agricultural produce at 115 (corresponding month of 1911-13 = 100) was 2 points below that of the previous month, but 3 points higher than in February, 1934, and 9 points above that for February, 1933. (If allowance is made for payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act, the index for February would be 122.) Changes in prices during the month under review were numerous, but the factors mainly responsible for the fall of 2 points in the general figure were the reductions in prices of fat cattle and potatoes, the lower index for fat sheep, and, to a lesser extent, the reduced values for wheat and pork pigs. Slight increases occurred in the prices of bacon pigs and clover hay.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1930.	1931.	1932.	1933.	1934.	1935.
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	—
April	137	123	117	105	111	—
May	134	122	115	102	112	—
June	131	123	111	100	110	—
July	134	121	106	101	114	—
August	135	121	105	105	119	—
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

Grain.—The average price of wheat during February was 4s. 8d. per cwt. or 1d. less than in January, and the index at 63 was 2 points lower. If allowance is made for the "deficiency payment" under the Wheat Act, 1932, the value of which has been altered since the January index to accord with the recently revised estimates of the anticipated supply for the current season, the index would be increased to approximately 121. Barley at an average of 8s. 2d. and oats at 7s. were 1d. and 2d. per cwt. dearer respectively; the index for the former was unchanged at 101, but that for oats was 1 point lower at 99, as the increase

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in the price of oats during the base period was relatively more pronounced. In February last year wheat averaged 4s. 5d., barley 9s. 2d. and oats 6s. 5d. per cwt., the indices being 60, 113 and 91 respectively.

Live Stock.—A slight rise in the average prices of fat cattle normally occurs between January and February, but during the month under review the average for second quality declined by 1s. to 31s. 4d. per live cwt. and the index depreciated 4 points to 91. (The effect of adding the cattle subsidy would be to raise the index to 105.) A year ago the average price was 35s. 8d. and the index stood at 103. Values for fat sheep have continued to advance, but as the increase in the corresponding month of the base period was proportionately greater the index moved downwards by 6 points to 134. Bacon pigs were 7d. per score dearer and the index rose 3 points to 20 per cent. above the pre-war level. Average values for pork pigs showed no change, but the index declined 3 points, as a slight rise in prices took place in 1911-13. Dairy cows and store cattle were cheaper than in the preceding month and the indices for both classes declined 3 points to 102 and 84 respectively. Store sheep were dearer, but the index declined 2 points to 109 for the same reason as for fat sheep. Store pigs also were dearer, but in this case also the index fell 9 points to 142.

Dairy and Poultry Produce.—Wholesale contract prices for the sale of liquid milk during February were the same as in January, and the index at 171 was unaltered. Butter averaged ¼d. per lb. more, and the index at 86 was 3 points higher. Cheese was a little cheaper than in the previous month and the index declined 3 points to 94. Eggs, as is customary at this season, were cheaper, by 1½d. per dozen, but having regard to the fall in the base period the index rose 1 point to 96. Poultry was dearer during February and the combined index appreciated 3 points to 124.

Other Commodities.—The downward movement in the prices of potatoes has continued, and this was reflected in a further fall in the index from 121 to 116: a year ago the index stood at 100. Clover hay was again a little dearer, and the combined index for hay was 1 point higher at 2 per cent. above 1911-13. Wool was unchanged on the month, but the index fell 1 point to 87. Some classes of vegetables were dearer than in the preceding month, and the index was 13 points higher at 131.

MISCELLANEOUS NOTES

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity	1933	1934				1935	
	Feb.	Feb.	Nov.	Dec.	Jan.	Feb.	
Wheat	71	60	66	66	65	63	
Barley	84	113	104	104	101	101	
Oats	85	91	94	95	100	99	
Fat cattle...	107	103	96	90	95	91	
„ sheep...	106	112	123	119	140	134	
Bacon pigs ...	98	129	103	107	117	120	
Pork „	109	135	118	124	128	125	
Dairy cows ...	111	101	105	103	105	102	
Store cattle ...	107	92	83	82	87	84	
„ sheep	82	91	107	99	111	109	
„ pigs	117	159	147	148	151	142	
Eggs	117	95	111	97	95	96	
Poultry	122	118	114	110	121	124	
Milk	150	161	161	171	171	171	
Butter	100	86	83	82	83	86	
Cheese	113	115	93	93	97	94	
Potatoes	113	100	146	133	121	116	
Hay	65	79	104	104	101	102	
Wool	63	100	85	84	88	87	

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	132	128	120 ⁵	123 ⁷	123 ⁵	121
Fat Cattle...	—	—	110	103	110	105
General Index ...	110	117	120 ⁹	120 ⁶	124 ¹	122

* Superseding figures previously published

Sixth World's Poultry Congress, Berlin, 1936

Active preparations are being made for the Sixth World's Poultry Congress, which will be held in Berlin from July 31 to August 9 next year. The Congress will include an international exhibition of live stock and industry, and will synchronize with the Olympic Games, which will also take place in Berlin. It is anticipated that a large number of foreign visitors will be attracted by the exceptional travelling facilities that will be available in connexion with these events. The Prussian Chamber, formerly the House of Parliament, has been secured for the Congress sessions, while the venue of the exhibition will be the spacious premises of the Berlin Fair. At the instance of the International Poultry Science Association, which is responsible

MISCELLANEOUS NOTES

for the organization of these triennial congresses, it has been decided to limit the number of exhibits in all sections. Full particulars of the exhibition may be obtained on application to the Secretary of the Annual International Congress at 6-7 Kochstrasse, Berlin, S.W.68.

Trials of Potatoes for Immunity from Wart Disease, 1934

THE trials which are arranged each year by the Ministry with the object of testing new varieties of potatoes for immunity from Wart Disease were again conducted in 1934 on the farm of the National Institute of Agricultural Botany, Ormskirk, Lancashire. The actual field operations and the taking of records were carried out by Mr. Harold Bryan, B.Sc., and Mrs. McDermott, of the Institute, but the trials were conducted on a plan approved by the Ministry.

Forty-six stocks were included in the second and subsequent years' tests, none of which developed Wart Disease. Of the 43 entries for the first year's tests, 3 became infected in the field; 2 were too poor to judge, but for the first time since the trials were instituted, there were no synonyms of existing varieties.

As in previous years, the results of the trials have been considered by a small committee composed of representatives of the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland, and co-ordinated with the results of the trials carried out by the two last-named Departments at Edinburgh and Kilkeel respectively.

The Committee recommended the approval of 36 new varieties, but only 2 of these have actually been added to the approved list. In the remaining instances inclusion has been postponed until such time as the raisers have intimated that the varieties have actually been or will shortly be introduced into commerce. Descriptions are given below of the new varieties, together with those of 3 other varieties which were recommended for approval as the result of trials carried out previously and which are now being introduced into commerce.

The findings of the Potato Synonym Committee of the National Institute of Agricultural Botany have been accepted by the Ministry where recommendations as to the classification of new varieties as synonymous with existing varieties have been made by that Committee.

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A list of the names of the more commonly grown varieties which have been approved as immune from Wart Disease may be obtained on application to the Ministry.

EARLY VARIETY.

"Doon Early"

<i>Sprout</i>	..	Pink.
<i>Tuber</i>	..	Oval; skin white; flesh white; eyes medium to deep.
<i>Haulm and Foliage</i>		Tall, upright, with close compact appearance; stems strong, nodes swollen; leaf open, rigid, with arched appearance; leaflets large and broad, medium to dark green; secondary leaflets very inconspicuous.
<i>Flowers</i>	..	White, stalks short, berries occur occasionally.

SECOND EARLY VARIETIES.

"Arran Signet"

<i>Sprout</i>	..	Blue.
<i>Tuber</i>	..	Thick kidney; skin white, slightly mottled; flesh white; eyes shallow.
<i>Haulm and Foliage</i>		Medium height, moderately strong, compact; leaf long and open; leaflets flat, large, glossy, soft appearance; secondary leaflets few and inconspicuous; wings straight; pink tinge general towards maturity.
<i>Flowers</i>	..	White, not frequent; dark red buds; orange anthers.

"The Alness"

<i>Sprout</i>	..	Pink.
<i>Tuber</i>	..	Oval; skin white; flesh white; eyes shallow.
<i>Haulm and Foliage</i>		Medium height, spreading; wings straight; leaf open, rigid; leaflets broad, ashy green, terminal leaflet well clear of last pair of laterals.
<i>Flowers</i>	..	White; strong stalk; orange anthers; dark buds; berries occur.

LATE MAINCROP VARIETIES.

"Duke of Kent"

<i>Sprout</i>	..	Faint pink.
<i>Tuber</i>	..	Round; skin white; flesh white; eyes medium
<i>Haulm and Foliage</i>		Tall, moderately strong, bushy; colour dark green; leaf intermediate, drooping; leaflets medium to large, waxy appearance, secondary leaflets large; wings crinkled; stems green.
<i>Flowers</i>	..	White, numerous; green buds; orange anthers.

"Red Letter"

<i>Sprout</i>	..	Bright red.
<i>Tuber</i>	..	Kidney, flat, long; skin pink; flesh white; eyes shallow.
<i>Haulm and Foliage</i>		Closely resembles "Kerr's Pink"—tall, strong, upright; foliage dies down a little earlier than "Kerr's Pink"; stems not so crinkled as "Kerr's Pink," and foliage more rigid.
<i>Flowers</i>	..	White, numerous.

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Stud Goat Scheme, 1935-36

It has been decided to continue, for another season, the British Goat Society's scheme for the improvement of milch goats kept by cottagers, smallholders and others of similar position. Under this scheme cottagers are able to procure the services of first-class stud goats for breeding purposes at a maximum fee of 4s. per service. The stud goats used must have been entered, or be considered suitable for entry, in the Society's Herd Book and they must have been bred from proved milk-producing stock.

Owners who wish to have their stud goats registered under this scheme should make early application to the Secretary of the British Goat Society, Roydon Road, Diss, Norfolk, who will be pleased to furnish them with full particulars. Applicants need not be members of the Society. Entries must be received on or before May 20, 1935. Goats submitted for approval must be available for inspection after that date on the premises at which it is proposed they should stand at stud.

Agricultural Scholarships

THE Ministry invites applications for the undermentioned scholarships which are being offered for award this year under the scheme of scholarships for the sons and daughters of agricultural workmen and others:—

Ten Senior Scholarships tenable at Agricultural Colleges or University Departments of Agriculture for diploma or degree courses in an agricultural subject, or at Veterinary Colleges for courses in veterinary science;

120 Junior Scholarships and *10 Extended Junior Scholarships* (for those who have already held Junior Awards), tenable at Farm Institutes or similar institutions, for courses not exceeding a year in duration, in agriculture, horticulture, dairying, or poultry husbandry.

The scholarships are open to the sons and daughters of agricultural workmen or of other rural workers in a similar economic position, and to persons who are themselves *bona fide* workers in agriculture. The value of the awards is such that neither selected candidates nor their parents are normally required to make any contribution towards the cost of the training provided. The usual method of selection is by interview, no written examination being required, but candidates must be able to satisfy the Selection Committee that they are in a position to derive educational benefit from the proposed courses of instruction.

The scheme under which these scholarships are awarded

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has now been in operation for 13 years, and assistance has been granted to some 1,400 persons. Many past students have succeeded in improving their positions substantially, and a number now hold important posts (scientific and otherwise) in the industry. Of those who have been trained no fewer than 10 per cent. hold administrative, teaching or research appointments of an agricultural nature, while a further 17 per cent. occupy posts of a supervisory character, such as managers of farms, nurseries, dairies and so on. It will be seen, therefore, that the scholarships afford exceptional opportunities to those who are able to obtain them and take full advantage of the education provided.

Full information concerning the scheme, including forms of application and a leaflet outlining the types of career open to scholars, may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, or locally from the offices of County Councils. The latest date for submitting applications is April 30, 1935

Some Wireless Talks to Farmers in April

<i>Date: April</i>	<i>Station</i>	<i>Time</i>	<i>Speaker</i>	<i>Subject,</i>
3, 10, 17, 24)	National	6.45 p.m.	Professor J. A. Scott Watson	Topics of the season
4	Scottish	6.30 p.m.	Mr. William Grant	April in the Garden
5	"	7. 0 p.m.	Mr. A. D. Buchanan Smith	For Scottish Farmers in particular
11	"	8. 0 p.m.	Miss Hilda Newbiggin	The Problem of Poultry Disease
18	"	6.40 p.m.	Mr. Joseph Duncan	For Scottish Farmers in particular
25	"	6.50 p.m.	Mr. Alexander Batchelor	Potato Marketing
1	North	8. 0 p.m.	Various speakers, including a farmer	Feature programme Wanted — the right weather
3	Midland	7.45 p.m.	Mr. G. M. Bounphrey and Sir Fabian Ware	Planning the country a Discussion
4, 18	"	6.30 p.m.	Mr. W. B Thompson	For Midland Farmers in particular
2	West	7.55 p.m.	Mr. H. A. Marquand and Mr. A. W. Ling	The Workaday World — Plough, Spade and Hoe
	N. Ireland		Mr. Peter Fitzpatrick	Farmers Work and Worry.

MISCELLANEOUS NOTES

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1, on March 14, 1935, the Rt. Hon. the Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Devonshire.—An Order fixing minimum and overtime rates of wages to come into force on March 24, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until March 21, 1936. The minimum rate for male workers of 21 years of age and over is 32s. 6d. (instead of 32s. as at present) per week of 52 hours in summer, except in the weeks in which Good Friday, Easter Monday and Whit Monday fall when the hours are 43, and 50 hours in winter, except in the week in which Christmas Day and Boxing Day fall when the hours are 32, with overtime unchanged throughout the period at 8½d. per hour on weekdays and 10d. per hour on Sundays and for all overtime employment on the hay and corn harvests. The minimum rate for female workers of 18 years of age and over is 6d. per hour (instead of 4½d. per hour for workers between 18 and 19, 5d. per hour for workers between 19 and 20, 5½d. per hour for workers between 20 and 21, and 6d. per hour for workers over 21 as at present) for all time worked.

Durham.—An Order fixing minimum and overtime rates of wages to come into force on May 14, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until May 13, 1936. The minimum rates for male workers of 21 years of age and over are (i) for horsemen who are householders 33s. (instead of 32s. as at present) per week of 50 hours, with, in addition, 7s. per week to cover all time spent in attention to horses; (ii) for horsemen who are not householders 32s. (instead of 31s. as at present) per week of 50 hours, with, in addition, 3s. 6d. per week to cover all time spent in attention to horses; (iii) for horsemen who are boarded and lodged by their employers 32s. (instead of 31s. as at present) per week of 50 hours and all time spent in attention to horses; (iv) for stockmen and shepherds per week of the hours customarily spent in attention to stock, householders 44s. (instead of 43s. as at present), non-householders 37s. 10½d. (instead of 36s. 10½d. as at present), workers boarded and lodged 36s. (instead of 35s. as at present); (v) for casual workers 6d. per hour as at present; and (vi) for other male workers 29s. as at present per week of 50 hours. The overtime rate for all classes of male workers of 21 years of age and over other than casual workers is unchanged at 8d. per hour except for overtime employment on Saturday afternoon, Sunday, Christmas Day and Good Friday when it is unchanged at 9d. per hour. The minimum rate for female workers of 18 years of age and over is unchanged at 2s. 6d. per day of 8 hours, with overtime at 4d. per hour.

Essex.—An Order fixing minimum and overtime rates of wages to come into force on March 24, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until April 11, 1936. The minimum rates for male workers of 21 years of age and over are 31s. (instead of 30s. as at present) per week of 50 hours in summer, except in the weeks in which Easter Monday and Whit Monday fall when the hours are 41½, and 48 hours in winter except in the week in which Christmas Day and Boxing Day fall when the hours are 31, with overtime throughout the year at 9½d. per hour (instead of 9d. per hour as at present) on weekdays (including

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Easter Monday, Whit Monday and Boxing Day) and 10½d. per hour (instead of 10d. per hour as at present) on Sundays and on Christmas Day. The minimum rate for female workers of 21 years of age and over is 6d. per hour (instead of 5½d. as at present) for all time worked.

Kent.—An Order fixing minimum and overtime rates to come into force on March 31, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until March 28, 1936. The minimum rates for male workers of 21 years of age and over employed wholly or mainly as horsemen, stockmen and shepherds are 33s. 6d. (instead of 33s. as at present) per week of 52 hours except in the weeks in which Good Friday and Christmas Day fall when the hours are 42½, with, in addition, 8d. per hour for all employment on customary duties in excess of these hours up to 60 hours per week. The minimum rates for other male workers of 21 years of age and over are 33s. (instead of 32s. 6d. as at present) per week of 52 hours in summer except in the week in which Good Friday falls when the hours are 42½, and 48 hours in winter except in the week in which Christmas Day falls when the hours are 39. The overtime rates for all classes of male workers of 21 years of age and over are unchanged at 9d. per hour on weekdays and 10d. per hour on Sundays, Good Friday and Christmas Day, except that the overtime rate payable to horsemen, stockmen and shepherds whilst employed on their customary duties is 9d. per hour. The minimum rate for female workers of 18 years of age and over is unchanged at 6d. per hour with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays, Good Friday and Christmas Day.

Hertfordshire.—An Order cancelling the existing minimum and overtime rates of wages and fixing fresh rates in substitution therefor to come into operation on March 31, 1935, and to continue in force until further notice. The minimum rates for male workers of 21 years of age and over are 32s. (instead of 31s. as at present) per week of 48 hours except in the weeks in which Easter Monday, Whit Monday, Christmas Day and Boxing Day fall when the hours are 39½ (or in the week in which Christmas Day and Boxing Day fall together 31), with overtime at 8d. per hour for all employment on Easter Monday, Whit Monday, Christmas Day and Boxing Day and in excess of the above-mentioned number of hours, and 10d. per hour for all employment in excess of 5½ hours on Saturday or other agreed weekly short day. The minimum rate for female workers of 19 years of age and over is 25s. (instead of 24s. as at present) per week of the numbers of hours mentioned above in the case of male workers, with overtime at 6½d. per hour for employment on Easter Monday, Whit Monday, Christmas Day and Boxing Day, and in excess of the above-mentioned numbers of hours, and 7½d. per hour for all employment in excess of 5½ hours on Saturday or other agreed weekly short day.

Somerset.—An Order fixing minimum and overtime rates of wages to come into force on March 31, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until March 28, 1936. The minimum rates for male workers of 21 years of age and over are 32s. 6d. (instead of 31s. 6d. as at present) per week of 52 hours in summer except in the weeks in which Good Friday, Easter Monday, Whit Monday and August Bank Holiday fall when the hours are 42½, and 50 hours in winter except in the week in which Christmas Day and Boxing Day fall when the hours are 32½, with overtime unchanged at 9d. per hour, except for overtime employment on the hay and corn harvests when the rate is

MISCELLANEOUS NOTES

10d. per hour. Provision is made for an adjustment in the hours in respect of which the minimum weekly rate is payable in the weeks in which Good Friday, Easter Monday, Whit Monday, August Bank Holiday, Christmas Day and Boxing Day fall to meet cases where alternative holidays are given within 14 days of such public holidays. The minimum rate for female workers of 21 years of age and over is unchanged at 6d. per hour for all time worked.

Warwickshire.—An Order varying the existing minimum and overtime rates of wages as from March 31, 1935. The minimum rates as varied in the case of male workers of 21 years of age and over are 30s. per week of 50 hours (instead of 52 as at present) in summer and 48 hours (as at present) in winter, with overtime at 8½d. per hour (instead of 8d. per hour as at present). For female workers of 18 years of age and over the minimum rate remains unchanged at 5d. per hour with overtime at 6d. per hour on weekdays and 7½d. per hour on Sundays.

Radnor and Brecon.—An Order continuing the existing minimum and overtime rates of wages from May 1, 1935 (i.e., the day following that on which the existing rates are due to expire) until October 31, 1935. The minimum rates for male workers of 21 years of age and over are 30s. per week of 50 hours in winter and 54 hours in summer with overtime at 9d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays.

Enforcement of Minimum Rates of Wages.—During the month ending March 14 legal proceedings were taken against five employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area.	Court.	Fines imposed.	Costs allowed	Arrears of wages ordered.	No. of workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Cheshire ...	Birkenhead	2 0 0	5 4 0	10 0	2
Notts ...	Retford ...	4 0 0	† —	13 9 8	2
Essex... ..	Castle	‡ 3 0 0	‡ 7 6	*	3
	Heddingham				
|| Derby . . .	Belper ..	\$ —	13 0	10 0 0	1
|| Carmarthen	Carmarthen	10 0	—	7 2 2	1
		£ 9 10 0	6 4 6	31 1 10	9

* Arrears of wages not yet available.

† Penalty includes costs

‡ Particulars are subject to verification.

\$ Dismissed under Probation of Offenders Act.

|| Details are subject to verification.

NOTICES OF BOOKS

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Dorsetshire.—Miss D. M. Evans, B.Sc. (Dairying), has been appointed County Dairy Instructor, *vice* Miss E. Bucknell, N.D.D.

Durham.—Miss Mena Jones, N.D.D., has been appointed Assistant Dairy Instructor, *vice* Miss R. Townend, N.D.D.

Nottinghamshire. Mr. D. V. Ingram has been appointed Assistant Instructor in Horticulture, *vice* Mr. R. A. Drummond.

WALES

Cardiganshire.—The death is announced of Mr. W. Lewis, F.R.H.S., Instructor in Horticulture.

Glamorganshire.—Mr. J. A. Milton, B.Sc., M.R.C.V.S., has been appointed Instructor in Veterinary Hygiene, *vice* Mr. D. E. Davies, M.R.C.V.S.

Monmouthshire.—Mr. R. P. Thomas, N.D.H., Horticultural Instructor for Merionethshire, has been appointed Senior Horticultural Instructor, *vice* Mr. E. W. Hobbis.

Mr. J. W. B. Holm has been appointed Assistant Horticultural Instructor.

Staffs of the Agricultural Research Institutes

Rothamsted Experimental Station

Mr. A. Coulston Evans, B.Sc., D.I.C., has been appointed Assistant Entomologist, *vice* Mr. H. C. F. Newton, B.Sc., A.R.C.Sc., who has been appointed Advisory Entomologist to the West Midland Province.

NOTICES OF BOOKS

Literatursammlung aus dem Gesamtgebiet der Agrikulturchemie. (*A Bibliographical List of the entire Domain of Agricultural Chemistry.*) Ed. by Prof. H. Niklas and Dr. A. Hock. Vol. III: Plant Nutrition. Pp. xlv + 1,114. (Wehenstephan bei München: Verlag der Bodenuntersuchungsstelle. 1934. Price R.M. 45.)

The publishers of this work desire to draw attention to the fact that the price quoted in the notice which appeared in the February issue of this JOURNAL, was for subscribers only. The present price for the single volume is R.M. 45.

Farm Buildings. By Edwin Gunn, A.R.I.B.A. Ed. by H. C. Long, B.Sc. (Agric.). Pp. 86 and 38 Figs. (Obtainable from H. C. Long, "The Birkins," Orchard Road, Hook, Surbiton. 1935. Price 5s., by post 5s. 4d.)

This book should be specially useful to architects who, in ordinary practice, rarely encounter the problems of ordinary farm design and detail. Farmers may be familiar with the points raised, but probably seldom see them elucidated on paper. There are those who have ability to design, but are ignorant of the farmer's exact requirements; while others, familiar by custom and training with all the details, are not used to explaining matters by word or pen. In point of fact, the skilled planner of farm buildings is extremely rare.

The author's experience of arrangement and planning in relation to farms, and making the best use of old buildings, must be almost unrivalled. His clear explanations, accompanied by plans and illus-

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trative details, cannot fail to be of service to those of his own profession who have to deal with agricultural buildings.

There is no expensive theorizing in this book, but clear information and practical economy; while the views expressed are in every instance up-to-date. Particularly valuable are the illustrations and remarks concerning the adaptation and rearrangement of old buildings, an interesting and profitable line of study to which sufficient care, with the aid of plans, has not yet been devoted.

Pioneers in Power Farming. By C. S. Orwin. Progress in English Farming Systems, VIII. Illustrated. Pp. 26. (Oxford: Agricultural Economics Research Institute. 1934. Price 1s. 6d.)

Nothing could do more to explode the fallacy that farmers are hide-bound by tradition than the publications which have already been issued in this series, and the latest number is no exception to this rule. For nearly 100 years the family of Bomford has been developing mechanized farming as rapidly as circumstances would permit. Practically no contemporary development in farm machinery has been neglected by successive members of this enterprising family, and not only has the latest machinery been adopted, but also members of the family and their staff have devised ingenious adaptations suited for the particular problems with which they have been confronted. Moreover, as one would expect, the family has not been slow to adapt its type of farming to suit the economic conditions of the moment, modifying systems of cropping and numbers and type of stock kept in accordance with market demands of the moment, although, of course, such modifications in farming are rather more difficult than in other industries. It is unnecessary to go into details here because the enterprises are fully described and illustrated in this pleasantly written booklet.

ADDITIONS TO THE LIBRARY

Agriculture, General and Miscellaneous

State College of Agriculture, Wageningen, Holland.—Dictionary of Terms Relating to Agriculture, Horticulture, Forestry, Cattle Breeding, Dairy Industry and Apiculture in English, French, German and Dutch. Compiled by T. J. Bezener. (251 + 294 + 267 + 249 pp.) London: Allen & Unwin, 1934, 25s.

International Institute of Agriculture.—Classification Scheme of Agricultural Science. (xxv + 171 pp.) Rome, 1934, 20 lire.

International Labour Office.—Studies and Reports, Series N (Statistics) No. 20:—International Comparisons of Cost of Living. A study of Certain Problems connected with the Making of Index Numbers of Food Costs and of Rents. (viii + 146 pp.) Geneva, 1934, 5s.

Devon County Council Agricultural Committee.—A Week's Budget for an Agricultural Labourer's Family in South-West England. (12 pp. + 2 tables.) Exeter, 1934.

United States Department of Agriculture.—Miscellaneous Publication No. 172:—Bibliography on Land Settlement with particular reference to Small Holdings and Subsistence Homesteads. (492 pp.) Washington, 1934.

Seale-Hayne Agricultural College.—Pamphlet No. 43:—Changes in Permanent Equipment of South Devon Farms, by J. J. MacGregor. (32 pp.) Newton Abbot, 1934.

Essex County Council.—Report of the Water Supplies in the Rural Districts, by J. M. Wood. (74 pp.) Chelmsford, 1934.

Rouveroux, P.—Le Métyage ce qu'il fait en savoir. (309 pp.) Paris: Librairie Agricole de la Maison Rustique, 1934, 12 fr.

International Institute of Agriculture.—International Directory of Agricultural Experimental Institutions in Hot Countries. (563 pp.) Rome, 1934, 20 lire.

ADDITIONS TO THE LIBRARY

- Meteorological Office*.—The Observers' Handbook. (1934 Edition.) (M.O. 191.) (viii + 152 pp. + 32 pl.) London: H.M. Stationery Office, 1934, 5s.
- School of Slavonic and East European Studies in the University of London*.—Monograph No. 2:—Collectivised Agriculture in the Soviet Union. (31 pp.) London, 1934, 1s. 6d.
- Blewitt, G.*—Observations of an Owner-Occupier. (57 pp. + tables.) 77-78 High Street, Chelmsford: J. H. Clark & Co., 1934, 2s.
- Batten, H. M.*—Our Garden Birds. Their Food, Habits and Appearances. (vii + 192 pp. + 39 pl.) London and Edinburgh: Nelson & Jack, 1934, 5s.
- Niklas, H., and Hock, A.* (Editors).—A Bibliographical List of the Entire Domain of Agricultural Chemistry. Vol. III. Plant Nutrition. (xlv + 1,114 pp.) Weihenstephan bei München: Verlag der Bodenuntersuchungsstelle, 1934, RM. 45.
- Aikin, J.*—England Delineated; or, a Geographical Description of Every County in England and Wales. (358 pp. + maps.) (6th Edn.) London, 1809.
- Kempski, K. E.*—Argentinien unter besonderer Berücksichtigung der argentinischen Landwirtschaft und ihrer Modernisierung. (56 pp.) Bremen: G. A. von Halem, 1933, RM. 2.50.

Agricultural Economics

- The New Fabian Research Bureau*.—Publication No. 17:—Marketing Boards and Import Control, by M. P. Price. (22 pp.) London, 1934, 6d.
- University of Oxford Agricultural Economics Research Institute*.—The Planning of Britain's Food Imports. A Quantitative Study of the Effects of Recent Legislation, by K. A. H. Murray and Ruth L. Cohen. (106 pp.) Oxford, 1934, 3s. 6d.
- United States Department of Agriculture*.—Agricultural Economics Bibliography No. 53:—State Measures for the Relief of Agricultural Indebtedness in the United States, 1933 and 1934. (402 pp. mimeo.) Washington, 1934.
- Willcox, O. W.*—Reshaping Agriculture. (157 pp.) New York: W. W. Norton & Co.; London: Allen & Unwin, 1934, 7s. 6d.
- United States Department of Commerce*.—Bureau of Foreign and Domestic Commerce. World Economic Review, 1933. (290 pp.) Washington, 1934.
- South-Eastern Agricultural College, Wye*.—Department of Economics Report No. XX:—Investigation into Farming Costs of Production and Financial Results. XV, Corn Growing: Costs of Production and Financial Results, 1924 to 1932, by J. Wyllie (pp. 137-178). Wye, 1934, 2s.
- United States Department of Agriculture*.—Bureau of Agricultural Economics. Index Numbers of Prices Received by Farmers for Farm Products, 1910-1934. (64 pp. mimeo. + graphs.) Washington. Revised 1934.
- United States Department of Agriculture*.—Agricultural Adjustment Administration. Achieving a Balanced Agriculture. (52 pp.) Washington, 1934.

Agricultural History

- Carman, H. J., and Tugwell, R. G.* (Editors).—Jared Eliot. 1685-1763. Essays upon Field Husbandry in New England and other Papers, 1748-1762, with a Biographical Sketch by R. H. Trus. (Columbia University Studies in the History of American Agriculture No. 1.) New York: Columbia University Press; London: Humphrey Milford, 1934, 17s. 6d.
- Ruston, A. G., and Witney, D.*—Hooton Pagnell. The Agricultural Evolution of a Yorkshire Village. (viii + 459 pp. + 11 plates.) London: Arnold, 1934, 25s.

ADDITIONS TO THE LIBRARY

Biological Science and Botany

- Crane, M. B., and Lawrence, W. J. C.*—The Genetics of Garden Plants. (xvi + 236 pp.) London: Macmillan, 1934, 10s. 6d.
Brimble, L. J. F.—Everyday Botany. (viii + 589 pp.) London: Macmillan, 1934, 7s. 6d.
Stanford, E. E.—Economic Plants. (xxiii + 571 pp.) New York and London: D. Appleton-Century Co., 1934, 21s.
Steele, Catherine C.—An Introduction to Plant Biochemistry. (viii + 356 pp.) London: Bell, 1934, 15s.
Imperial Bureau of Plant Genetics: Herbage Plants.—Bulletin No. 16:—The Theoretical Significance of Vernalization, by Prof. N. A. Maximov. (14 pp.) Aberystwyth, 1934, 2s. 6d.

Soils and Fertilizers

- Imperial Bureau of Soil Science.*—Technical Communication No. 30:—The Determination of Exchangeable Bases in Soil. (35 pp.) Harpenden, 1934, 2s.
Ringelmann, M.—Aménagement des fumiers et des purins. (227 pp.) Paris: Librairie Agricole de la Maison Rustique, 1934, 7 fr. 10.
Becker-Düllingen, J.—Handbuch der Ernährung der landwirtschaftlichen Nutzpflanzen. (viii + 523 pp. + 12 pl.) Berlin: Paul Parey, 1934, RM. 19.60.

Agricultural Machinery

- International Institute of Agriculture.*—International Trade in Agricultural Machinery. (200 pp.) Rome, 1934, 20 lire.
University of Oxford, Institute for Research in Agricultural Engineering.—Some Trends in Mechanized Farming. I, The Grain Harvest, by H. J. Denham. (8 pp.) Oxford, 1934.
University of Oxford Agricultural Economics Research Institute.—Progress in English Farming Systems VIII. Pioneers in Power Farming, by C. S. Orwin. (26 pp. + 11 pp.) Oxford, 1934, 1s. 6d.
International Institute of Agriculture.—International Directory of Agricultural Engineering Institutions. (185 pp.) Rome, 1934, 20 lire.
University of Oxford, Institute for Research in Agricultural Engineering.—Notes on the Technique of Mechanized Farming, by J. E. Newman. (44 pp. + 4 pl.) Oxford at the University Press, 1934, 1s. 6d.

Plant Diseases and Pests

- Union of South Africa Department of Agriculture.*—Science Bulletin No. 136:—Environmental and Control Studies of the Common Scab Disease of Potatoes caused by *Actinomyces Scabies* (Thaxt.) Guss. (78 pp.) Pretoria, 1934.
Cornell University Agricultural Experimental Station.—Memoir No. 155:—Studies in the Biology of *Phytophthora Infestans* (Mont.) de Bary. (40 pp.) Ithaca, 1934.
Imperial Bureau of Fruit Production.—Occasional Paper No. 3:—Annotated Bibliography on Bitter-Pit. (28 pp.) East Malling, 1934, 1s. 6d.
University of London Animal Welfare Society.—Ulaws Monographs No. 4b:—Man versus Rabbit. (2nd Edition.) (74 pp. + 9 pl.) London, 1934, 1s.

Field Crops

- Lord Bledisloe.*—Grassland—The Main Source of the Nation's True Wealth. A Survey of Modern Knowledge regarding the Formation, Maintenance and Improvement of Pastures. (36 pp.) Address delivered at Palmerston North, N.Z., at opening of 3rd Conference of N.Z. Grassland Association, 2/10/34.) Wellington: Gordon & Gotch. 9d.

ADDITIONS TO THE LIBRARY

- Imperial Economic Committee.*—I.E.C./S./2:—Survey of Oil-seeds and Vegetable Oils. Vol. III. Ground Nut Products. A Summary of Production and Trade in British Empire and Foreign Countries. (241 pp.) London: H.M. Stationery Office, 1934, 4s.
- University of Oxford, Agricultural Economics Research Institute.*—British Sugar Beet. Ten Years' Progress under the Subsidy, by A. Bridges and R. N. Dixey. (92 pp.) Oxford, 1934, 2s. 6d.
- The Rubber Growers' Association.*—Rubber and Agriculture. (64 pp.) London, 1934.
- International Institute of Agriculture.*—Coffee in 1931 and 1932. Economic and Technical Aspects. (231 pp.) Rome, 1934, 20 lire.
- Parker, H. H.*—The Hop Industry. (1x + 327 pp. + 7 plates.) London: P. S. King, 1934, 15s.
- United States Department of Agriculture.*—Circular No. 325:—Field Experiments with Vernalized Wheat (7 pp.) Washington, 1934.

Horticulture

- Henslow, T. G. W.*—The Rose Encyclopædia. New and Revised Edn, Edited by W. Brett. (320 pp. + 43 pl.) London: C. A. Pearson, 1934, 5s.
- Jex-Blake, A. J.* (Editor).—Gardening in East Africa. A Practical Handbook by Members of the Kenya Horticultural Society and of the Kenya and Uganda Civil Services. (xiv + 330 pp. + 6 pl.) London: Longmans, Green & Co., 1934, 12s. 6d.
- Mawe, T., Abercrombie, J., and Others.*—Every Man his own Gardener. (616 pp.) (13th Edition.) London, 1791.
- United States Department of Agriculture.*—Miscellaneous Publication No. 190:—Handbook of the United States Standards for Grading and Marketing Fresh Fruit and Vegetables (168 pp.) Washington, 1934.
- Scotland, Department of Agriculture.*—Miscellaneous Publication No. 12:—Strawberry Culture. (23 pp.) Edinburgh: H.M. Stationery Office, 1934, 6d.
- University of Reading, Agricultural Economics Dept.*—Financial Accounts Studies 6:—Financial Results of Strawberry Growing in Hampshire in 1934, by G. B. Bisset. (5 pp. mimeo.) Reading, 1934.
- Cornell University Agricultural Experiment Station.*—Memoir No. 161:—Physiological and Chemical Changes in Carrots during growth and storage. (18 pp.) Ithaca, 1934.
- Haldane, E. S.*—Scots Gardens in Old Times (1200-1800). (xii + 243 pp. + 9 pl.) London: A. Maclehose & Co., 1934, 6s.

Live Stock and Feeding

- Rice, V. A.*—Breeding and Improvement of Farm Animals. (xiii + 516 pp.) New York and London: McGraw-Hill Book Co., 1934, 24s.
- United States Department of Agriculture.*—Technical Bulletin No. 417:—Beef Production and Quality as Influenced by Crossing Brahman with Hereford and Shorthorn Cattle. (52 pp.) Washington, 1934.
- International Institute of Agriculture.*—Studies on the Development and Situation of Pedigree registering in the Cattle Breeding Industry. (92 pp.) Rome, 1931, 10 lire.
- Greig, O.*—Notes on Mating Stallions and Mares. (30 pp.) Moretonhampstead, Devon: W. Shobrooke, 1934, 1s. 3d. post free.

ADDITIONS TO THE LIBRARY

- Scottish Office.*—Report of the Committee on Valuation of Sheep Stocks in Scotland. (20 pp.) *Chairman: Rt. Hon. Lord Kinross, K.C.* Edinburgh: H.M. Stationery Office, 1934, 4d.
- The Pig-Keeper's Pocket Book and Diary*, 1935.—Published by W. O. Holmes, 51 Whittington Road, London, N.22, 1s. 6d.
- Vermont Agricultural Experiment Station.*—Bulletin No. 359:—The Feeding Value of Artificially Dried Young Grass II. (14 pp.) Burlington, 1934.

Small Live Stock

- "*Home Counties.*"—The Case for the Goat with the Practical Experience of Twenty-four Experts. (xviii + 169 pp. + 16 pl.) (New Edition.) London: Routledge, n.d.
- United States Department of Agriculture.*—Farmers' Bulletin No. 1730:—Rabbit Production. (38 pp.) Washington, 1934.
- Blount, W. P.*—Sexing Day-Old Chicks. (54 pp.) London: Poultry World, 1934, 2s. 6d.
- Washington Agricultural Experimental Station.*—Bulletin No. 299:—The Vitamin D Requirements of Chickens. (40 pp.) Washington, 1934.
- Pennsylvania Agricultural Experiment Station.*—Bulletin No. 303:—The Vitamin D Requirements of Growing Chicks and Laying Hens. (24 pp.) State College, 1934.
- Scott, G. R.*—The Art of Faking Exhibition Poultry. An Examination of the Faker's Methods and Processes, with Some Observations on Their Detection. (122 pp.) London: T. Werner Laurie, 1934, 6s.
- Brown, E. (Sir).*—Memories at Eventide. (xi + 271 pp. + 8 pl.) Burnley: John Dixon, 1934, 6s.
- Institut International d'Agriculture.*—Actes de la Conférence Diplomatique Internationale pour le Marquage des Œufs, Bruxelles, 7-10 Dec., 1931. (137 pp.) Rome, 1934, 15 lire.
- 5th World's Poultry Congress.—Proceedings of Congress held in Rome from Sept. 6 to 15, 1933, at the International Institute of Agriculture. (4 vols.) Rome: Ministero dell'Agricoltura e delle Foreste, 1934, 75 lire.

Dairying

- 10th World's Dairy Congress.—Rome-Milan. April 30-May 6, 1934. 7 sections. (187 + 574 + 210 + 125 + 140 + 97 + 128 pp.) Rome: Comitato Nazionale per il Latte e suoi Derivati, 1934.
- University of Reading, Department of Agricultural Chemistry.*—Bulletin No. XLVI:—Investigations into the Problem of Milk with a Low Content of Solids-not-Fat, by M. N. Nicholson and C. E. Lesser. (239 pp. mimeo.) Reading, 1934.
- Institut International d'Agriculture.*—Actes de la Conférence Diplomatique Internationale pour l'Unification des Méthodes de Prélèvement d'Echantillons et d'Analyse des Fromages. (Rome: 24-26 avril 1934.) (69 pp.) Rome, 1934, 15 lire.

Food

- Hambidge, G.*—Your Meals and Your Money. (xvi + 190 pp.) New York and London: McGraw-Hill Book Co. 1934, 6s.
- Kent-Jones, D. W.*—The Practice and Science of Breadmaking. (184 pp. + 36 pl.) Liverpool: Northern Publishing Co. 1934, 7s. 6d.
- Jack, F. B.*—One Hundred Home-Brewed Wines including Cordials, Beers and Syrups. (vi + 56 pp.) (5th Impression.) London: Country Life, 1934, 1s.
- Board of Trade.*—Final Report on the Fourth Census of Production (1930), Part III. The Food, Drink and Tobacco Trades, the Chemical and Allied Trades, the Paper, Printing and Stationery Trades. (xviii + 529 pp.) London: H.M. Stationery Office, 1934, 8s.

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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NOTES FOR THE MONTH

Spurious Cucumber "Mosaic" Due to Copper Poisoning

THE following note has been communicated by Dr. J. Caldwell, of the Rothamsted Experimental Station, Harpenden:—

A short time ago, a firm of nurserymen brought to our notice a peculiar condition arising in their cucumber seedlings, first noticed in 1934, when large numbers of seedlings had been discarded. About two-thirds of the seedlings (which were growing in small pots) showed chlorosis and distortion of the leaves such as might well lead to the suspicion that the plants were affected with a virus disease of the Mosaic type. (See illustration overleaf.) However, attempts to transmit the apparent disease to healthy cucumber plants by the usual methods employed in virus work failed. Furthermore, no parasitic organism was present; and, eventually, when the matter was probed to the bottom, it was traced to the toxic action of traces of copper. Full details will eventually be published elsewhere, but it may be said here that the symptoms displayed were usually a "clearing of the veins" and distortion, particularly well marked in the first foliage leaf. Subsequent leaves showed similar abnormalities and a number of the plants died. When, however, the plants were transferred to new pots, the later leaves developed normally and no further trouble was encountered. By careful inquiries, made at the nursery, the trouble was traced to the pots into which the seedling cucumbers had been transferred from the seed-boxes. These pots, it was discovered, had been thoroughly boiled before use, with the idea of preventing any possible infection arising from them as a result of their previous use.

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Some of the pots had been boiled in a cast-iron boiler, and these gave no trouble. Others had been boiled in a copper container. The latter had originally been tinned, but two years previously it had been repaired with copper that was not tinned. The trouble with the young cucumber plants, and a somewhat similar one in tomatoes, was traced to small quantities of copper that had been absorbed by the pots from this particular boiler. It is evident, therefore, that care should be exercised in nurseries and elsewhere to avoid possible toxic contamination from unsuspected sources. Furthermore, it is clear that symptoms in a plant suggestive of virus attack should not be taken as conclusive evidence of the presence of a virus. Corroboration or otherwise by experimental tests should always be sought.

Black or Garden Nightshade

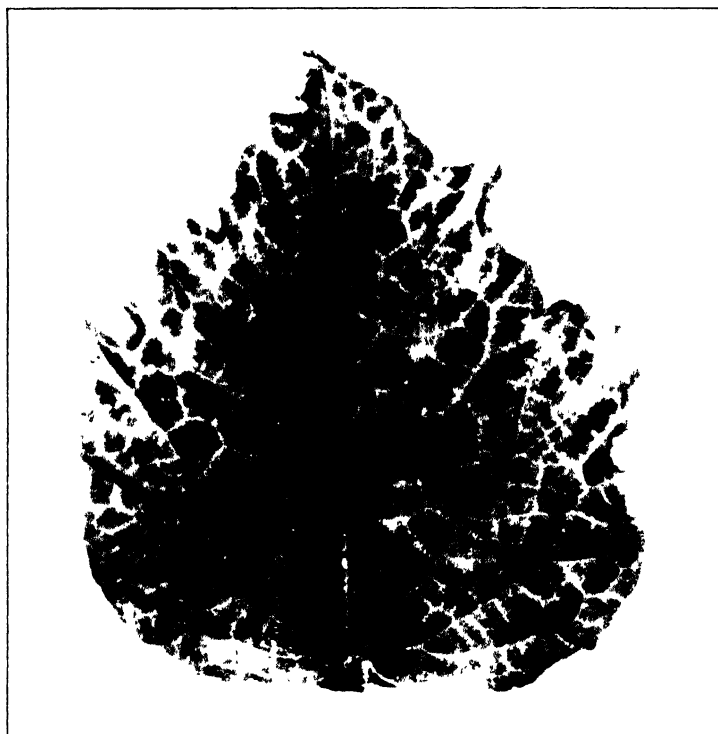
THE following has been communicated by Dr. D. H. Robinson, of the Harper Adams Agricultural College:—

During the last two beet-lifting seasons, inquiries have been made by Shropshire farmers concerning Black or Garden Nightshade (*Solanum nigrum*, L.) which is becoming increasingly common in the county. The plant is often mistaken for Deadly Nightshade (*Atropa belladonna*, L.), of which it is a close relative. Questions were asked last autumn as to whether the plant was likely to poison sheep folded upon the beet tops.

Long, in his *Plants Poisonous to Live Stock** states that "there can be no doubt that, though it must always be regarded as poisonous, this plant varies considerably according to soil, climate and general condition of growth. For this reason, the plant may sometimes be eaten in considerable quantities without ill effects, while in other instances it will undoubtedly prove poisonous." He adds later that the downy, and more prostrate, form of the plant has been considered the more poisonous.

Specimens sent in to the Harper Adams Agricultural College were all of the more erect type, reaching, in some instances, a height of over two feet, with berries considerably larger than the normal. In fact, the plants were so large that there was some excuse for a farmer mistaking

* One of the Cambridge Agricultural Monographs, 2nd Ed. revised, 1924.



Copyright Photo: Dr. Caklcell

Cucumber leaf exhibiting symptoms of spurious "Mosaic" due to copper poisoning

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them for Deadly Nightshade, in the absence of the characteristic flowers.

The advice given was to fold the sheep in the usual way, but to keep a sharp look out for anything unusual. At the same time, it was recommended that the largest of the plants should be removed as the beet was lifted. No reports were received of losses of sheep as due to this weed.

It is interesting to note that a considerable increase of the weed in Shropshire has synchronized with the introduction of beet cultivation. Ten years ago, the plant was by no means common in the county, and specimens required for the Botanical Garden at the College were obtained from Norfolk. Now, the weed is widespread in North Shropshire, and the plants are of unusual size.

NOTE.—The Editor is informed by Mr. F. Rayns (Director of Agricultural Education for Norfolk) that Black or Garden Nightshade has been more abundant in Norfolk during the past two years, and that the observation has been confirmed by a member of the horticultural staff and by a number of farmers. Further, it has been prevalent in all the root crops, in gardens, on waste land, and in marrow-stemmed kale. It is considered that, owing to its habit, it is more likely to appear and persist in the root crops than in the cereals, which are harvested earlier than the roots and do not permit such late development. Moreover, the bushy habit of the weed enables it to compete more effectively with an open root crop than with well-shaded cereals; while, like its relative, the tomato, it thrives best during hot, dry weather. It is, therefore, suggested that the abundant growth and increase noticed by Dr. Robinson is a result of the past two abnormally hot and dry seasons.

An account of Garden Nightshade is given in the Ministry's Miscellaneous Publication No. 61, *Weeds of Arable Land* (paper covers, 2s. 10d.; quarter bound, 3s. 5d.; cloth boards, 3s. 11d., post free prices); and a note of its poisonous character in Bulletin No. 75, *Poisonous Plants on the Farm* (paper covers, 2s. 3d.; cloth boards, 3s. 4d., post free prices). These can be obtained from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

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The Grey Squirrel

THE grey squirrel has been mentioned in earlier issues of this JOURNAL. It again appears likely to become a serious pest of the countryside. In 1931 its numbers were greatly reduced, mainly by an epidemic disease, and as a result it was comparatively scarce in 1932 and 1933. Investigations by the Oxford University Bureau of Animal Population show, however, that in 1934 the species made a substantial recovery and spread over fresh areas.

Unless measures are taken for their control, there is a serious risk that grey squirrels will eventually colonize the greater part of the country, to the detriment of agriculture and horticulture. The Ministry hopes, therefore, that farmers and all others connected with agriculture will do their utmost to encourage the destruction of grey squirrels, and particularly to prevent them from migrating into districts that have hitherto been free from infestation.

The widespread distribution of the grey squirrel in this country results from introductions that have taken place since 1889. The specimens first introduced were obtained from America, and several other stocks have since been brought over independently, but most of the secondary centres were established by squirrels from one or other of the centres previously formed.

Grey squirrels appear to favour mixed deciduous woods, parklands, orchards and gardens, rather than the dense coniferous woods that are the ideal habitat of the native red squirrel, which has never been regarded as a menace to agriculture. They spend a good deal of time on the ground, and are frequently seen in hedgerows and fields some distance from any wood or plantation. The food of the grey squirrel is very varied, including green shoots and buds, the bark of trees, nuts and seeds, fruit, both wild and cultivated, bulbs and roots of various kinds, birds' eggs and young, and carrion. The destruction of young shoots and buds of trees has serious effects on the growth. The destruction of fruit tree buds in the spring has a pronounced effect upon the yield of fruit. During the spring and early summer a favourite food is the succulent inner bark of young trees, the sap-bearing layer being peeled completely off, large patches often girdling trees of 10-20 years' growth. Since the rapidly-growing industry of fruit-farming is especially liable to the depredations of these

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animals, their concentration in fruit-growing areas would undoubtedly lead to a serious position. Moreover, the indirect results of the destruction of beneficial insectivorous birds by grey squirrels might become of serious significance to forestry and all forms of agriculture and horticulture.

It is not difficult to keep the grey squirrel within reasonable bounds if concerted action is taken against it, although its extermination would be almost impossible by any means available at the present time. It cannot be too strongly emphasized that if the animal continues to be tolerated, and even encouraged, by a large number of people, as it certainly is at present, its increase can never be checked. The general attitude towards the animal will determine whether it is to be kept under efficient control, and there is ample evidence to prove that it should be treated as a highly injurious pest.

Shooting and trapping are the only methods at present available to keep down the numbers of this animal, since poisoning can rarely be resorted to with safety. By rigorous shooting at all seasons of the year much can be done to check the increase; dogs can readily be trained to give valuable assistance in squirrel-hunting, both by finding the animals and driving them into view of the gun—a most important point, as otherwise these squirrels are extremely adept at keeping a tree between themselves and a charge of shot. A satisfactory method is for two guns and a dog to work together, as the squirrels, when “marked” by the dog, are then invariably within reach of one of the guns. A .410 shot-gun or .22 sporting-rifle serves admirably for squirrel-shooting; a powerful air-rifle is also quite efficient for the purpose.

Many keepers make a practice of putting a charge of shot into any new squirrel nests seen in the spring, and this is to be recommended to farmers and keepers generally as a frequently successful mode of attack in the course of an ordinary walk round a farm estate. Particular attention should be paid to the killing of the first grey squirrels seen in a district; for, as already explained, isolated pairs frequently migrate considerable distances, and if allowed to settle down and breed will soon be the pioneers of a new colony; timely shooting may prevent such an event.

The formation of squirrel clubs, or general vermin clubs, among landowners and farmers is strongly recommended as

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giving an incentive for keeping down the number of grey squirrels.

Trapping, except in particular instances, is not usually favoured by farmers, but gamekeepers will readily apply this method of keeping down the pest. It has been found by many keepers that these squirrels are easily attracted to flesh and egg baits by the same procedure as is adopted for stoats. The pattern of trap used should be efficient and humane. In this connexion it may be noted that the use of spring traps, except in rabbit holes, is prohibited by the Ground Game Act, 1880, and that, having regard to the Wild Birds Protection Act, 1904, the fixing, placing or setting of any traps or similar instrument on any pole, tree or cairn of stones or earth, for the purpose of catching grey squirrels is not permissible as the law stands at present. A very useful trap where the squirrels are numerous is a wire-netting cage, 2 to 3 ft. square, with a "sleeve" entrance at either the top or side, corn being used as a bait; such a trap has the advantage of remaining set for an indefinite period, and any other animals or birds that may be caught accidentally can readily be released. The tunnel trap also has been found to be very satisfactory. The trapped animals should be destroyed in the most humane manner possible.

The importance of adopting concerted action for the destruction of grey squirrels cannot be over-emphasized, as if this is not done there is every reason to believe that these aliens will quickly become an unmitigated pest throughout the country.

THE VALUE OF ACCOUNTS IN FARM MANAGEMENT

JAMES WYLLIE, B.Sc., N.D.A., N.D.D.,
South-Eastern Agricultural College.

SIMPLE financial accounts form the foundation for a system of accounting which is of very great value in farm management, and, just as the foundation of a house is quite indispensable and yet useless unless the house itself is built, so the preparation of simple financial accounts forms a necessary first step in the construction of what may be called Farm Management Accounts.

Limitations of Simple Accounts.—Do not let there be any misunderstanding. We may say that simple financial accounts are of very limited value as an aid to more efficient management, but this does not mean that they may not have considerable value from other points of view. For example, they may be necessary or desirable for Income Tax purposes, and they are certainly both necessary and desirable wherever the farm is under a salaried manager, as on "home" farms, institutional farms and the like. Further, the drawing up of a statement of profit or loss on each year's working, however simple it may be, should be regarded as a matter of the most elementary business. The fact remains that, although great emphasis has been laid—and rightly laid—upon these and other uses of simple financial accounts, it is only within very recent years that the keeping of farm accounts has been viewed from another angle, namely, the help which properly-kept accounts can be in grading up the efficiency of the management. Again and again farmers have objected that accounts are "just history," they summarize *what* has happened, but they give little or no indication as to *how* the net financial result—profit or loss—has come about or as to *why* it is no better than it is. For example, simple accounts will show the farmer that his milk receipts have fallen off by, say, £100 because of a reduction in the price of milk—information which is easily obtained *without* any accounts at all—but they do not show him whether his *net* results from milk production are better or worse because of some alteration

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in the production costs—information which can be obtained *only* by means of properly-kept accounts. It may be urged that it will be time enough to talk about management accounts after the majority of farmers have been initiated into the keeping of simple financial accounts; on the contrary, if farmers could be convinced that these simple accounts provided an essential foundation for the preparation of accounts which would really help them to become more efficient managers the keeping of simple accounts would receive a very big impetus. Many farmers do not keep simple accounts because they just cannot be bothered, perhaps, as many others, because they are quite convinced that they are not worth keeping.

Managerial Efficiency.—Let us be clear on this question of managerial efficiency. It has been said that we must not judge efficiency in farming entirely according to the profit and loss account, but if we are going to regard a farm as a business unit it is difficult to see on what other basis efficiency can be judged. Thus, the business man is frankly amused at the question: "Does good farming pay?" because he would be inclined to regard *any* method of farming as "good" which did pay. Again, farming has been described as "a mode of living" rather than as an ordinary business, but, even so, surely the object is to get as *good* a living as possible from it—and does not this depend essentially upon what would be called in business the "profit" that is made year by year? It is true that the measurement of profit is less easy on the farm than it is in the factory or mercantile house, but this does not affect the general principle that the objective of the farmer is just the same as that of the business man, namely, to get the largest possible annual income and so to raise his standard of living to the highest possible level. Nevertheless, we must be careful not to assume that *comparative* efficiency amongst farmers in general can be assessed on the basis of the annual profit per acre, per cow, or per any other unit. The farmer who is earning 5 per cent. on his capital to-day may be a much *less* efficient manager than the one who is losing 10 per cent., because obviously the conditions may be entirely different. Further, the fact that a farmer lost £2 per acre one year and earned £2 per acre the next year does not necessarily mean that he had suddenly become a much more efficient manager, because

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the change may have been due to factors over which he, as manager, had no control—weather, prices, and so on.

Tests of Managerial Efficiency.—It is this example that perhaps gives the clue to the essence of efficiency in farm management. Briefly, it consists of (1) ability to take full advantage of the *local* conditions of soil, climate, markets, etc., and this again depends upon the choice of the most suitable system of farming—a matter of judgment and careful accounting rather than of hard and fast rules; (2) ability to control those factors in the management that are, wholly or largely, controllable—the manager may not be able to control the *prices* of foodstuffs, but he can control the *quantities* used.

(1) *Selection of Best System of Farming.*—As regards the first of these tests of managerial efficiency the accounts should give some help in deciding whether some important change in the general system of farming should be considered. It is a truism that a system that may be very suitable at one time may be quite unsuitable at another; but it is also true that a system that may be giving satisfactory results for the farm as a whole may nevertheless have within it serious leakages, the existence of which is *unknown* to the manager. Traditional methods die hard. A farmer will maintain that he *cannot* grow corn without sheep, that he *cannot* produce winter-milk economically without roots, that he *must* grow oats for his horses and so on. What he often fails to recognize is that there is now an infinitely greater choice of alternative methods of manuring, feeding, cultivating, etc., than there was in the days when these traditional methods were established, and many progressive farmers have no use at all for “must-nots” and “can-nots.” Take examples:—

(a) There is the farmer who asserts that he *must* keep cattle in order to make farmyard manure. That assertion takes on a different complexion if properly-kept accounts show that the cost of the manure ranges from 15s. to 20s. *per load*. In two instances within the writer’s knowledge the farmers decided with great reluctance that in view of the high cost of making yard manure, as shown by their accounts, they would just *have* to find a substitute for it. It is safe to say that without accounts these farmers would still have been “keeping cattle to make muck.”

(b) Similarly, accounts may show (and have shown) that

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in some seasons fattening sheep kept on folding crops cannot pay anything at all for these crops, so that either a loss must be shown on the sheep or the whole cost of the folded crops must be carried by the succeeding crops. Now it is one thing to put the "fold-tail" (folding residues) at £3 to £5 per acre, but very different if it must be put at £8 or £10 per acre, and it is only by means of suitable accounts that it is possible to determine what sum the sheep *can* afford to pay for the folded crops.

(c) Or take another example of a different kind. In 1928 a certain farmer in Kent grew sugar-beet on a small scale, and in spite of the handicap of heavy carriage to the nearest factory he decided to include it, temporarily at least, in his cropping plan. His accounts cheered him on year by year, and in 1934 he obtained a profit of over £6 per acre on fully 20 acres. It is fairly certain that but for what his accounts told him this farmer would have given up sugar-beet several years ago and increased his acreage of potatoes (with, as things developed, somewhat disastrous results—losses on potatoes instead of profits on sugar-beet).

There can be little doubt that part of the reluctance which is shown by many farmers towards any departure from established customs is due to lack of knowledge of the internal make-up of the farm economy. At one time, accurate diagnosis of certain ailments of the human body was very difficult, but now the X-ray apparatus enables the doctor to *see* just what is wrong. *Management accounts represent the X-ray apparatus of the farm manager*; instead of having to *guess* (and many assertions are no more than guesses) that the root of the trouble is so-and-so, properly-kept accounts would enable him to *see* what was wrong. Of course, it is not suggested that this "X-ray treatment" is always necessary in diagnosing the ills of the farming business. For example, the large grazier who buys store cattle at 38s. per live cwt. and sells them fat at 36s. hardly needs any kind of accounts to tell him what is wrong; but there are numerous problems connected with the general organization of the farm as a money-making business that are quite insoluble without the aid of properly-kept accounts.

A word of warning is perhaps necessary at this point. Before they can be effectively used in this way, management accounts must be available over a period of not less than three or four years, but they must first of all be available for one year, that is, a start must be made. It is the

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slowness with which accounting knowledge matures that deters many farmers from making a start, but hasty conclusions, based upon insufficient or unreliable evidence, may be worse than no conclusions at all.

(2) *The Detection and Elimination of Waste.*—As regards the second test of managerial efficiency the case is much simpler and more easily stated. No one will deny that conditions on the farm differ very widely from those in the factory. No man can control or predict the weather conditions of the coming season, and consequently the best-laid plans of the farm manager may go badly astray through no fault of his own. The writer has again and again emphasized the very important part that seasonal conditions play in determining the net financial returns from a farm, and yet we must not shut our eyes to the fact that some factory methods can be applied on the farm. For example, meticulously accurate control over the raw materials used is an essential feature of modern factory management, and *considerable expenditure* is incurred in order to obtain such control. Now the modern farm, unlike that of a hundred years ago, uses raw materials on a large scale, in the shape of purchased foodstuffs and manures, coals, petrol, paraffin, oil, binder-twine, spraying materials, sacks, and so on; but it is only very occasionally that effective control over the use of these raw materials is even attempted. Further, large quantities of raw materials are produced on the farm itself—grass, hay, roots, straw, silage, etc.—and here it is common knowledge that effective control is even rarer than with purchased raw materials. It is true that in recent years great emphasis has been laid upon “controlled grazing,” but of all the raw materials used on the farm grass is probably by far the most difficult to control, simply because it must be used “as it grows” so to speak, and no one can say just how fast it will grow, that is, how much of it there will be to control.

There is, however, one important difference between the farm and the factory, even in respect of this question of controlling the use of raw materials. It is this. In the manufacture of factory products it is known that each product is obtained by bringing together various ingredients *in definite proportions* and that the efficiency of the whole process depends upon maintaining these proportions. On the farm things are not quite as simple as this. For example, it is impossible to say definitely that the most

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economic dressing of artificials for a certain crop consists of 6 cwt. per acre of a mixture containing so much "nitrogen," so much "phosphoric acid" and so much "potash"; nor is it possible to say definitely that the most economic way of feeding cows is to give them just $3\frac{1}{2}$ lb. (per gallon) of a concentrated "production" ration containing certain proportions of protein, oil, carbohydrates, etc. It may happen, therefore, that if the cowman feeds at the rate of $3\frac{1}{2}$ lb. per gallon, in spite of his instructions to feed only $3\frac{1}{2}$ lb., the net results may actually be better rather than worse. In other words, the cowman *may* know more about the economic feeding of the cows than the farmer does. It is clear, however, that in such a case the better result is due not to the efficiency of the management, but in spite of its inefficiency.

It is always necessary to keep this point in mind in comparing the farm with the factory as regards the control that should be exercised over the use of raw materials, but it is true that the efficiency of the management must be measured on the assumption that the best results will be obtained only if the instructions given are carefully carried out.

All this may seem to be far removed from the subject of management accounts. Actually, there is no use talking about management accounts unless we have a fairly clear idea of the object of keeping them, and there can be no doubt that one of their chief functions is to enable the farmer to measure, for himself, his efficiency as a manager.

Simple Financial versus Management Records.—As already observed, one serious objection to ordinary financial accounts from a management point of view is that they merely record what has happened; they show, for example, the total expenditure (generally year by year) on wages, foodstuffs, manures, repairs and so on, but they give little or no sure indication as to whether the expenditure on any of these items is higher than it need have been in order to get the same results. It is true that attempts have been made in this direction by calculating various relationships—wages to total expenditure and revenue, foodstuffs to net income from live stock, capital to turnover, and so on—but this line of attack does not make proper allowance for the very complicated inter-relationships that exist between all the various items of expenditure, as well as between the

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various items of revenue. A relatively *high* percentage of wages in the total expenditure may be a good sign rather than a bad one, an indication of highly efficient management rather than of inefficiency, and a reduction in the wages bill might have *harmful* reactions all the way through both expenditure and revenue.

Management accounts, on the other hand, tackle the problem of economic spending from an entirely different angle. Take a very simple example. A wheel is "squeaking"; it is *crying out* that there is *waste* going on, and of course a drop or two of oil or a touch of grease at once silences it. More often than not much more serious waste is going on *unknown* to the management, and it will continue until the management takes steps for its detection. It is just here that management accounts play their part.

It is now generally recognized, for instance, that without milk records no manager, however experienced and however good a judge of stock he may be, can place a group of cows in the order of their milking capacity merely by looking at and handling them. Similarly, no manager who is not keeping systematic feeding records knows at all accurately just what quantities of foodstuffs his various live stock have consumed in a given time. Farmers who used to maintain that they did know their best milking cows just by looking at them no longer take this view, and in the same way farmers who think they know just what rations their stock are consuming have only to keep feeding records to convince themselves that they were working under a delusion.

In most instances, the average herd yield of milk can be obtained at the end of the year without milk records at all, but of what use would such information be? It is *the keeping of the milk records* that is the important thing. So also with foodstuffs and manures and materials of all kinds, as well as with labour; records enable things to be checked day by day and week by week, they enable the manager to keep his finger on the pulse of every activity on the farm and to detect many troubles almost as soon as they begin. This is far better than waiting until the end of the year and then making guesses as to what was right and what was wrong—a procedure that savours too much of a *post-mortem* examination to be suitable for a *live* business.

To sum up this part of the case for management accounts, it can be said that the immediate object is to assist the

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manager in the detection and elimination of waste of all kinds, whether of time, of materials or of temper, to keep him informed as to whether his instructions are being carried out with reasonable accuracy. The ultimate object is to provide information that would be invaluable in the general re-organization of the farm in the light of existing economic conditions.

Importance of Reliable Evidence.—There is, however, another important aspect of management accounts. It has been tacitly assumed that such accounts will be kept by farmers *for* farmers as a part, an essential part, of good business routine. It is curious how many people seem to be concerned about conducting economic investigations into farming. Farmers are invited to co-operate in this or that investigation, and in many instances they express their willingness to help—the investigator. Surely this point of view is all wrong. Dare we look forward to the time when *farmers* will ask for such investigations to be carried out, *when they will expect the investigator to help them?* It is safe to say that this time will not come until farmers can be persuaded that there is a definite cash value attached to management accounting.

Again, is it too much to expect that when a farmer protests that the price of this or that commodity is at a ruinous level he should be able to back up his protest by quoting from his management accounts? How many farmers have recently declared in no uncertain terms that the prices obtained from the Pigs Marketing Board are less than the costs of production—but how many of them have any worth-while evidence to substantiate their declarations? Far be it from me to suggest that management accounts should be kept *mainly* with the object of making out a case for higher prices. But the point is that accounts kept *primarily* for management purposes would be automatically available as evidence of the true position of any enterprise on the farm. The day is long past when mere assertions, however numerous and strong they may be, will be accepted as actual evidence, especially by “business” men, such as bacon-curers, milk-distributors, and so on.

The Nature of Management Accounts.—It is far beyond the scope of this article to attempt any detailed description of the way in which management accounts

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should be kept, but it may be useful to give some indication of the procedure. It follows at once from what has already been said that such accounts have their origin in records kept on the farm from day to day and from week to week, not only by the farmer himself, but also by his workers. Of course, many farmers will find here an excuse for doing nothing; they will say that their workers are incapable of keeping any sort of record, and that even if they were capable they would be very unwilling to do so. This may serve as an excuse, but it is not a *reason*, because the writer's *experience* (not his idea) is that the great majority of farm workers are both capable and willing to do their share in keeping such records as are necessary to make farm management more efficient. Is it really asking too much of the horseman to set down day by day where he has been working, what he has been doing and how long he took to do it? Does the milk-recording cowman not show great interest in the records, and is there any cause to think that he does not keep them accurately? Is such a cowman incapable of putting down also the quantities of the various foodstuffs that he uses week by week? Can a cowman be feeding his charges in a business-like manner if he does *not* know with reasonable accuracy just what he is using?

However carefully the workers may keep the original records of labour, foodstuffs, manures, petrol, paraffin, etc., there is still something left for the farmer in his capacity of manager. He must not only take steps to make this original recording as straightforward as possible, but he must also be prepared to tabulate the information obtained in a systematic way. For example, he must try to make the record-forms as simple as possible, he must have a definite plan for the issue of all kinds of raw materials, and above all he must see to it that all the records are kept *up to date*. This last point is of overwhelming importance. Once let the records get into arrears and the work becomes irksome and inaccurate.

I am fully aware that the great majority of farmers, being just human like the rest of us, do not like clerical work. They will probably say that even on the average-sized farm, the keeping of management records and accounts would require at least one full-time clerk. Actually, the time required *per day* would be surprisingly little, probably thirty minutes or so, especially after a little practice. There is no need for a farmer to keep every possible kind of record

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at the same time. If only a start could be made, the habit would grow; as soon as the value of the results became apparent the appetite for more would be whetted. The second step, that is the construction of the management accounts themselves, will appear to many to be quite beyond the capacity of most farmers. To begin with, of course, this is perfectly true, and much of the advice that is given to farmers on this question is calculated to deter, rather than to encourage, them even to try. The bogey of cost accounting is no doubt a very real one, but what the writer has in mind is not cost accounting at all, in the proper sense of that term. Let the farmer start off by constructing accounts for the main farm enterprises—milk production, sheep, pigs, arable land and so on, and he will find that by the application of a little common sense and only a modicum of accounting knowledge he can obtain results that will give him a valuable insight into the *internal* workings of the farm. Or, let him just keep a careful record for particular *fields*—of wheat, potatoes, sugar-beet and so on—and again the results will come to have very great value. There is no use denying that there are difficulties to be overcome, but, in general, it can be said that these difficulties always appear to be much more formidable than they actually are. In any event, a farmer who wants help in this connexion can always get it by sending a postcard to the County Agricultural Organizer.

In conclusion, let me say that the object of this article is to encourage farmers, and others, to become *interested* in this matter of management accounting. No doubt I have been rather provocative in places, but I have said nothing that is not based upon a life-time's experience of farmers and farming, and upon about a dozen years' experience of practical management accounts.

MUSHROOM-GROWING IN THE UNITED STATES*

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THE cultivation of mushrooms is a long-established industry in the United States of America. It has shown a rapid growth and its steady expansion has recently been accompanied by the development of certain dependent industries such as those of canning and spawn-making. The most noticeable feature is that with this rapid development there has also been progress in technique, so that at the present time the whole industry is using the best possible equipment and has the most advanced ideas in growing methods, in disease-control, in spawn-making and in canning. It has at its disposal the service of several research workers who are able to give whole-time attention to the problems that arise.

In England, notwithstanding the longer establishment of the industry, a sudden expansion has taken place only in the last few years, probably as a result of the imposition of a tariff on fresh mushrooms, and a large amount of capital has been invested. With this expansion there should likewise be some progress in method, and it is therefore of particular interest to see in what way some features of American mushroom-growing differ from those of our own.

The Horticultural Census† of the United States gives every detail of the mushroom-growing industry, and this indicates that 363 of the 516 growers have their establishments in the State of Pennsylvania. Here they are more or less concentrated in Chester County where they are within reasonable distance of the New York and Philadelphia markets and of town manure supplies. Mushroom-growing here is not a haphazard occupation, and its specialized nature is realized when the growing establishments are seen.

They consist of well-designed tier-bed houses of standard pattern, usually in blocks of 3 or 4 or in ranges of 12 or more (Figs. 1 and 2). On either side of a central path-

* A travelling fellowship was granted to the writer by the Ministry of Agriculture and Fisheries. The time spent in the United States was from May 8 to June 6, 1934.

† *Fifteenth Census of the United States, 1930. Horticulture.* U.S. Department of Commerce, Washington, 1932.

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way (3 ft. wide) the tiers or shelves, $5\frac{1}{2}$ ft. wide and six in number, are arranged one above another on a wooden framework. They consist of rot-resisting cedar bed-boards resting loosely on bearers that are spaced to allow a vertical distance of at least 18 in. between the surface of a finished bed (6-7 in. deep) and the bed-boards next above. The tiers are as much as $5\frac{1}{2}$ ft. wide because they are approachable also by pathways (2-3 ft. wide) around the sides and ends of the house; the hot-water pipes are in these pathways and are attached to the sides of the building. The uprights of the framework, set at intervals of 4 ft., support, in addition to the weight of the beds, a false ceiling at a height of 3 ft. above the top beds. On the level of the 4th bed from the floor, bearers are placed across the central and lateral pathways, and planks are laid on these to provide a gangway from which it is possible to perform work on the otherwise inaccessible upper shelves. Two doorways, one above the other, are necessary, at least at one end of the building, in order to gain access both to the ground-floor pathway and to the raised plankway above. The average establishment has 27,000 sq. ft. and the largest about 1,000,000 sq. ft. of mushroom beds. Owing to the extremes of cold and heat in winter and summer the houses are well insulated; a convenient size is found to be 20 by 60 ft. Hot-water pipe heating is employed in winter and a few of the larger growers have installed cooling systems by radiator and artesian-well water or by the ammonia process. The cost of cooling was found, however, to be excessive and the artesian-well method none too efficient in the really hot weather. It was useful for carrying late-cropping beds through June and into July when the *average* shade temperature is over 70° F. Without any cooling, the usual cropping period is from October 1 to about May 15, when the hot weather begins, but the greatest quantity of mushrooms is produced from December 1, the aim being to supply the Christmas demand.

Manure is delivered by rail to sidings on the premises or to public sidings, and also by lorry; the supply comes from the large cities. The present price is \$5.00 (20s.) per ton f.o.b. New York, and the top price \$6.00 (24s.). By the time it is on the composting ground it has cost \$7.00 to \$8.00 (28s. to 32s.). Four thousand rail trucks, each of 25-30 tons capacity, go annually to Chester County. The price of manure during February and March is very much



Fig. 1. Two ranges, each consisting of 28 double music-cripples. Part of a plant at Kennett Square, Pennsylvania. The photographs were taken at the end of May, 1934, when the houses were empty.



Photos Dr. B. M. Ware

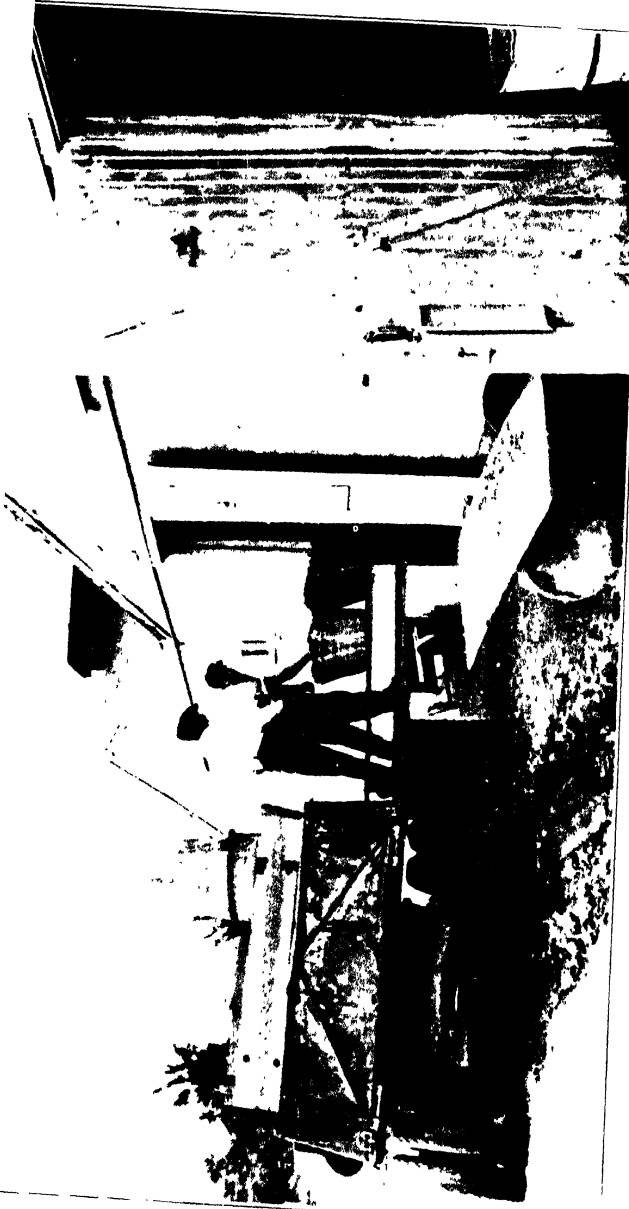


FIG. 3. Transporting the upper shelves of a composting bin using a narrow plank trolley. A narrow plank trolley is a height of 60 cm from the floor. At upper shelves, a small amount of material is used. About 1 m³ of material is used in this case. (Dr. W. M. Ware, West Coast, Papua New Guinea, May 20, 1964)

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less and, as a result, large quantities are bought and stored until required in the summer—a practice not seen in England. Stacks of 100 to 1,000 tons are made. These heaps, 8-15 ft. high, very compactly made and covered with earth (Fig. 2), are kept in the open without cover for several months.

It is noteworthy that only in one instance was a turning ground with concrete floor met with. No attempt seems to be made to avoid the constant use of the same hard earth site, and nowhere was the manure turned under cover. The absence of composting sheds cannot be accounted for by dry conditions, for the monthly precipitation in Chester County is about double that in the S.E. of England except in October, November and December, when it is the same.

TABLE I.

AVERAGE MONTHLY RAINFALL (INCHES).

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Average Annual
Kennett Square, Pennsylvania	3.53	3.65	3.95	3.80	4.37	4.29	4.35	5.01	4.11	3.39	3.34	3.76	47.55
S.E. England ...	2.20	2.05	2.05	1.69	1.77	1.89	2.17	2.32	2.13	3.46	3.07	3.11	27.91

AVERAGE MONTHLY TEMPERATURE (°F.).

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Average Annual
Kennett Square, Pennsylvania	30.8	30.7	40.2	50.5	61.1	69.2	73.9	71.8	66.3	54.9	43.2	33.2	52.2
S.E. England ...	39.4	40.1	42.1	46.7	52.2	57.7	61.1	60.9	57.3	50.8	44.9	41.3	49.5

The universal adoption of the tier system of growing is, to a European, the most striking feature of the American industry, and when it is remembered that mushroom-growing in the States has become highly specialized and that that the men engaged in it are fully occupied with this and nothing else, it is obvious that there must be very good reasons for growing mushrooms on shelves rather than on the floor. The first of these appears to be that the maximum cubic capacity of a building is utilized instead of being partially wasted as in so many mushroom houses in England, and the second that the system lends itself to the operation of pest-control measures with a good chance of success. It is possible to fumigate the beds not only when they are first made and are at "peak heat," but also at later stages,

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without serious wastage of the fumigant. The main criticism levelled at the shelf-bed system by those who have never seen it in use is that the houses would be troublesome to fill or to empty. In actual fact, very little difficulty exists if the houses are well situated on a levelled site cut into the side of a hill or with an artificial embankment so that the compost can be run in on trucks on a plank gangway at the level of the fourth bed from the floor. Bushel baskets are filled with the compost and are placed on the trucks. All bed-boards are loose and, except those on the bottom shelf, are set on their edges before filling begins. It is then only necessary to throw the compost down on the bottom bed and, when this is filled, to lay down the boards of the second bed and, later, those of the third and fourth. The fifth and sixth beds are within easy reach of the men on the plank gangway (Fig. 3).

After seeing this system of mushroom cultivation, the impression is gained that the English grower is too frequently labouring under unnecessary difficulties because he persists in trying to produce a crop in ill-chosen farm buildings that are commonly not well enough adapted for the purpose. In addition to having to put up with the effect of draughts, lack of insulation and leaky walls and roof (which make fumigation ineffective), the English grower uses only the floor, and wastes both space and fumigants in this way. English growers, however, who produce large crops on outdoor ridge beds, and those who grow mushrooms in glasshouses in the winter are masters of their art, for no such methods are adopted in the United States. The absence of outdoor beds in America is best explained by examination of meteorological conditions, and particularly the average monthly temperatures (Table I). In October and November (when outdoor bed-making begins in England) the temperature is about the same as in England. In December, January and February it becomes 8 to 10 degrees colder in Pennsylvania than in England, and the *average* is near or below the freezing point. In March and April the temperatures become much the same, but then (when in England the crop is at its best) the hot season begins in America and, from May to September, each month is about 10 degrees hotter than in England. The fact that the Pennsylvanian rainfall is about twice that of the S.E. of England in spring and summer (February to September) probably has little bearing on the matter.

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The canning of mushrooms, including their preparation in soups and ketchups, forms part of the American industry, and is not alone the business of distinct cannery organizations. The rapid development, since 1917, of these canneries, which deal exclusively with mushrooms, has been of great benefit to the growers who have built them, as well as to others, as they absorb from one quarter to half the output and also have the effect of steadying market prices. The canneries are large enough each to deal with from 3½ tons to 6 tons of mushrooms a day, and their busy season is from October to the end of June.

The establishment of a Mushroom Growers' Co-operative Association at Kennett Square, Pa., is an interesting development of American mushroom-growing. It was started in 1925-26 and now has a membership of about 375. The Association owns large office buildings, a cannery (operating since 1931), a fleet of 28 motor vans for transport of members' produce to the city markets, while it has laboratories and an experimental mushroom house for entomological work and artificial compost trials. Since 1928, research has been fostered by the Association, and, by reason of its activities, the U.S. Department of Agriculture set aside a sum of \$12,000 (£2,400) for mushroom research at Washington. This grant has been continued during the following years and the Association is well pleased with the results so far obtained. Among its many objects is the safeguarding of members in their purchase of equipment (baskets, wire, paper, sulphur, manure and spawn), and it supplies most of these at the lowest rates.

In the marketing of mushrooms, 3-lb. chip-baskets, wired together in packages of six and bearing the grower's code number or full name and address, are employed. The only other package is the 1-lb. carton, which is used occasionally for the "chain-store" trade, or more extensively in districts other than those of the Eastern United States. Several grades are recognized, but at the time of the writer's visit, when mushrooms were scarce, they meant little to the New York buyers, who found it necessary to examine the contents of the baskets in Washington Street Market. Prices are 4d. to 11d. per lb., but in hot weather when supplies are short, 1s. 4d. to 2s. 8d. or even 4s. per lb. may be obtained. From this, 10 per cent. is deducted for commission and 4 per cent. as a trucking charge.

MUSHROOM-GROWING IN THE UNITED STATES

General problems of mushroom-growing are being investigated by Dr. E. B. Lambert, of the U.S. Department of Agriculture at Washington, D.C. These problems include the investigation of fungus diseases, the efficiency of stable-manure substitutes, the effect of CO₂ concentrations on the growing crop, the nature of the fermentation processes in heaps of manure, variation in mycelial growth of spore-cultures, and the technique of plot arrangement for yield trials. Dr. J. W. Sinden, of the Pennsylvania State College, is also devoting whole-time attention to research problems, and is interested particularly in cultural work and in artificial composts. Mr. Aubrey Thomas, with headquarters at the Co-operative Association Buildings, Kennett Square, is in the centre of the industry and well placed for the whole-time study of pest-control problems, as also is Mr. L. Walcott, who is concerned with the making and trial of spawn and of manure substitutes. At New Brunswick, N.J., Dr. S. A. Waksman and colleagues are working on substitutes for stable-manure, and at Washington, D.C., fumigation problems are being investigated by the co-operation of Dr. A. C. Davis (entomologist) and Dr. H. D. Young (chemist). Dr. W. S. Beach, at the Pennsylvania State College, is also investigating the fungus diseases of the mushroom crop.

In view of the very general interest, both in England and the U.S., in the possibility of finding a substitute for stable-manure, the fact deserves mention that while four research workers are exploring the whole subject in America, no work is being done on this matter at present in England. The results so far obtained give indications that satisfactory substitutes will be found, but the American grower is informed that for the time being the only reliable medium is horse-manure, and that if he desires to make a trial of any suggested substitute, it should be only on a small scale. It should be pointed out that the problems of pest-control are not likely to be very much simplified even if horse-manure were to be dispensed with entirely.

While the insect and allied pests of the mushroom crop are much the same in the two countries, slight differences exist in the fungus diseases and invaders. Thus, a Truffle (*Pseudobalsamia microspora*) that invades mushroom beds and prevents cropping, is causing grave concern to growers in America but is so far unknown in England. The mush-

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room-bed Sclerotium (*Xylaria vaporaria*), common in England, and *Clitocybe dealbata*, are not met with by the American grower. All other diseases and invaders, however, are common to both countries.

The present article gives no more than an outline of some of the main features of mushroom-growing in the U.S.A.; further details will be found in the recently published third edition of the Ministry's Bulletin No. 34, which deals fully with mushroom-growing. (Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 1s. 3d., by post 1s. 5d.)

THE FATTENING OF BACON PIGS

THE VISCOUNT LYMINGTON.

THE writer has had experience in fattening pigs for pork, but he does not consider that it is sufficient for him to write with any authority, yet he is of opinion that, while pork pigs often fetch more per score and provide a quicker turnover of cash, to fatten bacon pigs at a reasonable profit the year round is more economical. Provided that the last ten weeks in the fattening period of a bacon pig show a profit in pounds of weight gained for food and labour expended, the longer period reduces the rate of cost per pig in overheads for keeping the sow or paying the initial price for the stores.

Both for breeder and feeder, stability of market is essential. We can treble our output of bacon pigs and yet have no over-production for the home market, and we would give work to at least 70,000 more men in so doing. Thus, the obstacles to ensuring stability of market for good quality of produce are external, and are for the politician to deal with before the producer can be blamed for his shortcomings. In spite of the improvement under the bacon scheme, we are still very far from stability. The writer believes that the present shortage of bacon pigs for contract is far more due to uncertainty about the future than any potential lack of pigs. For instance, no small man finds it easy to contract for a year ahead with cash penalties for non-fulfilment of his contract. He is forced at present to contract for unborn pigs. A difference of one pig in the litter average probably means 12 per cent. difference in his contract margin, while he is penalized on 5 per cent. variation. Season alone can make this difference in fertility. This is very unfortunate for the speedy regeneration and increase of our breeding stock. In addition, it should be noticed also that the curers have now managed to obtain grading restrictions which are more severe than those which the Danes impose upon themselves.

The writer has stressed this because what follows is an attempt to describe experience in fattening for contract, often more in faith than certainty.

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Since the small feeder can contract under the group system, the first consideration is the feeding. The pig is a common factor, but considerations of housing are limited by the resources of the feeder. The needs of the pig's stomach are as much a mystery to the vet. as the diseases of the neurotic rich seem to be to the Harley Street specialist. But nearly all vets. are honest enough to admit their ignorance. In general, feeding provides resistance to disease in animals as well as human beings. Therefore, it is important to remember that rapid fattening will only be economic if the ration is sufficiently suitable to provide resistance to disease. Any cheap food that is dangerous to the pig is not an economy. For instance, the curers do not like a pig fed with fish meal or gromax for the last period of its fattening. Meat meal is cheaper but likely to be injurious, though it is supposed to supply the necessary vitamins. Soya bean meal is a good substitute, but soya bean meal should be ordered with great care; the cheaper brand is often harmful to the pig because of the variation in quality. Likewise, imported barley meal of the cheaper brands may be dangerous. It is the writer's practice, therefore, to rely, while his crop lasts, on home-grown barley, and to buy as much as possible of his grain whole to mill himself for feeding. He attributes the health of his pigs, after much bitter experience of minor ailments, to three things: good housing, great care in choosing his bought food, and the co-operation of a local miller and importer whose judgment and honesty are above question. With so many things against him, including the whole trade world in combination, this last is of vital importance.

After weaning, the life of a fattening pig is important only in that it should produce good meat at an economic cost. The future constitution of the pig, say at 18 months, ceases to be of importance. Thus, unlike breeding stock, one can afford to feed for bacon under artificial conditions. But one must always bear in mind that a check in growth is more expensive than any other failure in farming operations. To feed 3 lb. to 5 lb. of meal a day, which is not increasing the pig's live weight, is pure loss. Therefore, it is the writer's method to use only the most well-tried rations and to limit his experiments to small isolated groups. This does not mean that there are not many ways of substituting other rations without danger to the pig. For instance, some years ago, when pork was at a high price, and potatoes

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could not be sold, the writer fed all his potatoes to porkers, and saved in the meal bill the equivalent of £44 per acre for his potato crop. If he has lucerne available, it is often his practice to put stores from two to four months old on the lucerne in alternating runs, and so save about 2 lb. per day in meal. Many believe this produces better quality bacon. Though he cannot answer for its economy, he has sometimes folded stores in September on kale and rape where these were easily available. When the price of pork and bacon was infinitesimal, he fenced in a convenient wood close to water. There his stores lived for five months on 1 lb. of meal per day, and only took a few weeks to finish for market in the autumn. But all these catch methods are matters for judgment at particular moments to be used as the individual feeder thinks fit. The only practice that the writer can recommend with the authority of regular experience is folding on lucerne in the summer.

But to return to the food for fattening pigs which is readily obtainable and most generally economic, the writer recommends the following mixtures. These mixtures are cheap at the moment, but, if maize were to rise in price, its place could well be taken by a wheat product. They have not only the writer's experience, but general experience, behind them. For stores up to 16 weeks,* i.e., for approximately two months after weaning, he feeds 35 per cent. barley meal, 35 per cent. weatings, 20 per cent. maize, 5 per cent. soya bean meal, 5 per cent. gromax. Thereafter, until the pigs go to the factory, he feeds 50 per cent. barley meal, 15 per cent. maize meal, 25 per cent. weatings, 10 per cent. soya bean meal. There is a mineral mixture of limestone and salt included in these rations.

The pigs are fed wet twice daily; and it has not been found necessary to heat the mixture in winter owing to the even warmth of the fattening houses, which will be described below. Undoubtedly, results could be improved if it were possible to feed skim milk; but, while the writer produces from 500 to 700 gallons of milk per day, it has not been possible to feed skim milk under the regime of the Milk Board. There is no doubt whatever that, in the future, the

* If the stores are inclined to be "porky," it is better for their ultimate grading in the factory that they be kept up to 19 or 20 weeks on the store mixture. This may keep the pigs a fortnight longer in the fattening pen, but it does produce bonus pigs.

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Milk and Pig Boards should endeavour to co-operate. A trade agreement between the Government and the farmers of the country protecting butter would be more valuable, not only to the farming industry but to coal and manufacturing industries at home, than any foreign trade agreement. Pigs, beef and milk cannot be considered as separate entities in farming. They are closely interlocked in the general economics of agriculture. The sooner this is realized in a live stock country like Great Britain, the healthier it will be, not only for farmers but the general public. But, until we can get skim milk from our creameries, the above types of mixture are probably as sound as possible. These have produced a high percentage of bonus pigs, often up to 80 per cent. in a weekly batch going to the factory, and averaging 69 per cent. on 800 sent to the factory in the last ten months of the contract period.

The writer experimented with one famous English proprietary mixture and one Danish proprietary mixture, using a similar pen of pigs on his ordinary mixture as controls. The pigs were carefully selected for weight, size and shape, and divided into three groups of ten in each pen. The sexes were also distributed in equal proportion to each pen. He found that the Danish mixture produced an increase of 1 lb. live weight per 3.55 lb. of meal, while his own and the English proprietary mixture took 3.77 lb. for 1 lb. of live weight gain. But the Danish and English proprietary mixtures cost £8 12s. 6d. approximately per ton, and his own mixture cost £7 2s. 10d. per ton. The grading of the batch on his own home-milled mixture was better than on the other two. Thus, there was an average saving in favour of his mixture of about 6s. per pig in the fattening period. This experiment would have to be repeated several times before one could give a definite pronouncement, but it is interesting none the less, even when due allowance has been made for error.

Summing up on the question of feeding, the writer would say that it pays to fatten indoors in winter and to use some such standard mixture as he has described above. The greatest care should be used in buying food. By buying almost exclusively from a trustworthy merchant and by milling all the grains as far as possible on the farm, better results, with less risk, are obtained. The writer would eschew meat meal and all but the very best proprietary feed mixtures. Above all, he would eschew refuse from hotels

THE FATTENING OF BACON PIGS

or camps. These bring not only ordinary disease, but expose him to the risk of "foot-and-mouth" from the uncooked bones of imported meat. Some experienced feeders also recommend half a day's fast in every week as a check to digestive troubles.

For the large farmer, with good buildings, it has been possible to make some profit up to date under the bacon scheme, and if the scheme continues to be stable, and is not given over to the curers, or sacrificed to the importers, a reasonable profit should continue to be made. But it is not easy for the small man, feeding small numbers, to make money unless he can make up with his own care and labour for what he loses in uneconomic purchases of feeding stuffs, and unless he can be sure of good housing conditions.

Good housing is vital to the early maturity of bacon pigs. Unless the pig can be got to the factory before it is eight months old, the chances of profit under the bacon scheme are very slender. The writer has had bitter experience of many kinds of bad housing, makeshift and lack of housing, of thatched barns and cart sheds, converted stables, old-fashioned pigsties, yards and cow byres, woodlands, and wintering on the open-air system. He realizes that the modern system with thermostatic ventilation means capital outlay, which, even if it can be afforded, is not easily justified unless there is an assured and stable market for at least five years ahead. Therefore, from the small feeder's point of view, he proposes to discuss the makeshifts first.

The essentials in housing are clean, sunny ground, good drainage and freedom from draught. An old chalk pit, with adequate shelter and some slope to it, may prove a very good spot, since the chalk drains well and is useful as a natural mineral. Moreover, if it has not been previously fouled, it acts as its own disinfectant. If it faces rightly, it provides an ideal shelter from high winds. If, as well, there is no need to run the pigs in large batches, and it is handy for feeding and watering, it is a makeshift to be recommended.

A well-sheltered and well-drained yard is also useful. But it is essential that it has not been fouled by disease previously, or the feeder will almost certainly have trouble. A yard must have its sheltered corners and lying-sheds on the high ground. Enough fresh litter is necessary in wet weather.

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Converted stables or cowsheds are rarely satisfactory, since they are generally dark and ill-drained; and often disease has eaten deep into the woodwork. Pigs have a mysterious and cantankerous way of refusing to thrive whatever you do for them in some old buildings. The writer once expended a considerable sum in dividing up an old thatched corn barn into runs for fattening pigs, with new floor and drains. He let in light and made sleeping quarters with extra overhead shelter. But nothing would make stores thrive therein. Winter and summer, they scoured or refused to grow, and the pigs took nine or ten months to mature. Vet. and expert could not help him.

Perhaps the worst place of all in which to try to fatten pigs is the old-fashioned sty built fifty to eighty years ago. It is generally disease-ridden, is nearly always dark, and often faces north.

Temporary pig huts, such as were described in the previous article* for farrowing sows, placed in a sheltered and well-drained yard, or a chalk pit, are probably the best makeshift for the fatterer who cannot afford to build real fattening sheds. If such places are not available, then it would pay the farmer to build temporary places on fresh ground. But drainage and shelter are essential. A month's check from disease, or a fortnight's from hard weather, is pure loss, which no subsequent treatment can recover. Feeding a hundred pigs, one would be horrified if 20 died and the 80 flourished. But it would be just as serious a loss if the fattening period had to be extended from five to six months after weaning, owing to a month's check in feeding the whole 100.

Whatever one does in summer, the problem of winter fattening remains. Therefore, the writer proposes to describe the best method of housing he has yet discovered. This does involve capital expenditure and therefore demands security of markets in future. With the help of Mr. Troup, the Hampshire Agricultural Organizer, and of Mr. Harrison, the Assistant County Architect for Hampshire, the best methods in Scandinavia and the Continent were explored and then adapted in the houses he has built, and, later, these have been altered as experience dictated.

The illustrations of the houses (Figs. 2, 3 and 4) will describe them better than words. The main essentials are

* *The Breeding of Bacon Pigs*. This JOURNAL, April, 1935, p. 19.

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small pens so that the pigs can be constantly regraded according to their size and temper. The form of the houses is such that the cubic capacity can be most economically used in building and the length in drainage. The ventilation is thermostatic,* so that pigs have plenty of fresh air and no draughts. In winter, the body heat of the pigs is used always to keep the temperature about 60° F. even in hard weather. In summer, the windows and doors assure plenty of air. The asbestos roof, lined with celotex, gives ample shelter from cold and heat. The floors are concrete so that drainage is easy; but underneath the concrete is a layer of coke breeze on rammed chalk, so that it is never chilly for the pigs to lie upon.

The shed for the stores to come into after weaning is built generally on the same plan as the finishing houses, only here the pens are built to hold twenty pigs at a time, instead of ten as in the sheds for the larger pigs. A space is left for storing dry foods, and a mixing tank of concrete is used. Water is laid on in all the houses to save labour in preparing the meal, and for convenience in washing up. A tank for storing water is in the rafters. This provides a heavier head of water than comes direct through the pipe line. It also has the advantage of leaving the water for some hours before feeding in the warmest part of the shed, and thus taking the chill off the wet mash.

The galvanized iron tubing used as a barrier between sections is a practical economy and affords ease in cleaning. The drainage is towards the sides, so that the ground where the pigs lie is naturally the driest. In the finishing houses, there is a dunging passage, which the pigs learn to use of their own accord. By means of a gate, which fastens both laterally and longitudinally, the passage can be used as a runway for cleaning out the dung or moving the pigs. The dung is stored just outside the houses and carted away as often as possible, preferably every day when the work of the farm permits. Very little litter is necessary, as the foundation of the concrete bed is warm and the pigs learn to be clean. This makes the pig manure very rich, and saves endless dung carting when 300 to 450 pigs are being fattened at one time. The drainage for the liquid manure goes through a series of catch pits into a soakaway in the chalk. The writer makes no attempt to use the liquid

* The ventilator used by the writer is the Robertson extractor ventilator.

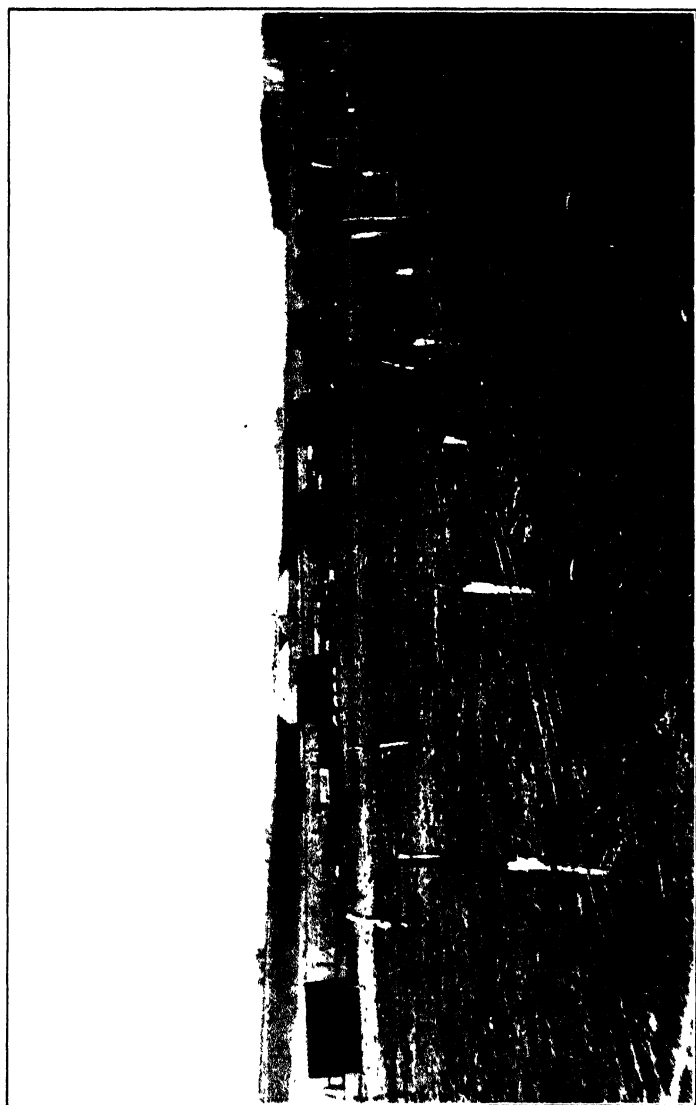


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FIG. 1. Range of burrowing huts and pens on the Farleigh Estate

Huts are 5 ft. by 6 ft. 6 in. in plan, slopes of the high eaves (which overhang 6 in.) and ridge is 6 ft. 10 in. from floor. Downway opening is 5 ft. 6 in. wide by 4 ft. 10 in. high. The huts are built of four longitudinal slabs of masonry 12 in. high and 5 in. thick. Aerial view of one of the huts appears in the April 1932 issue of this JOURNAL.

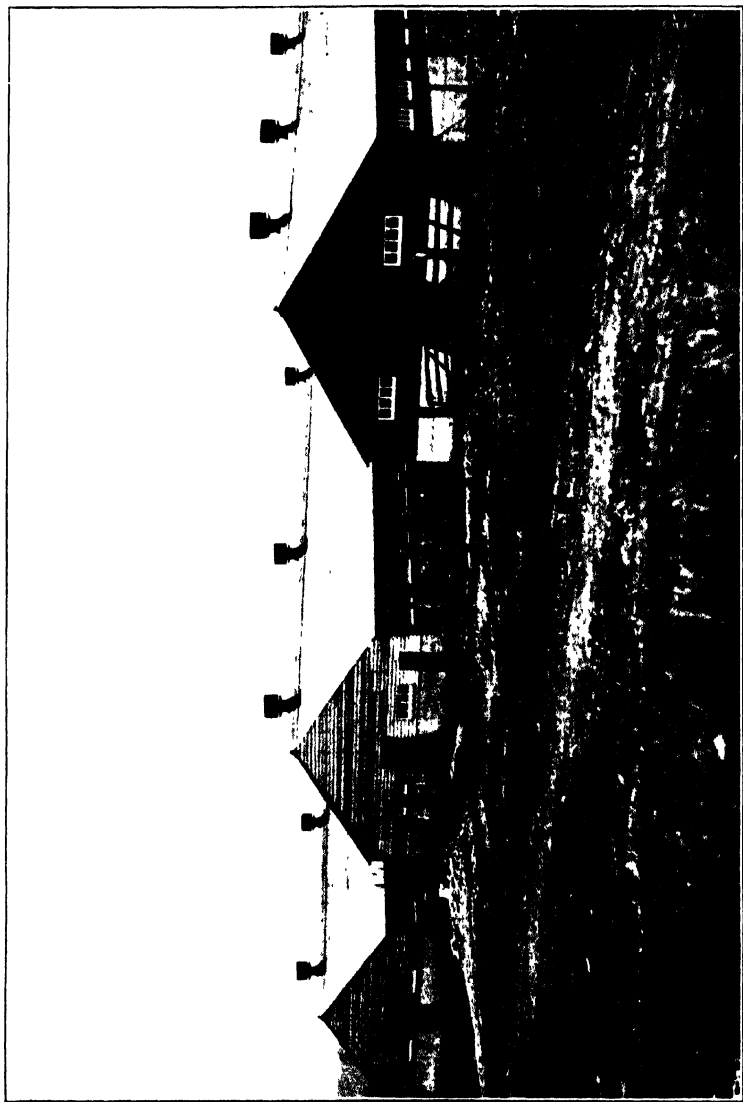


FIG. 2. Exterior view of log bathing houses on the Earleigh Estate
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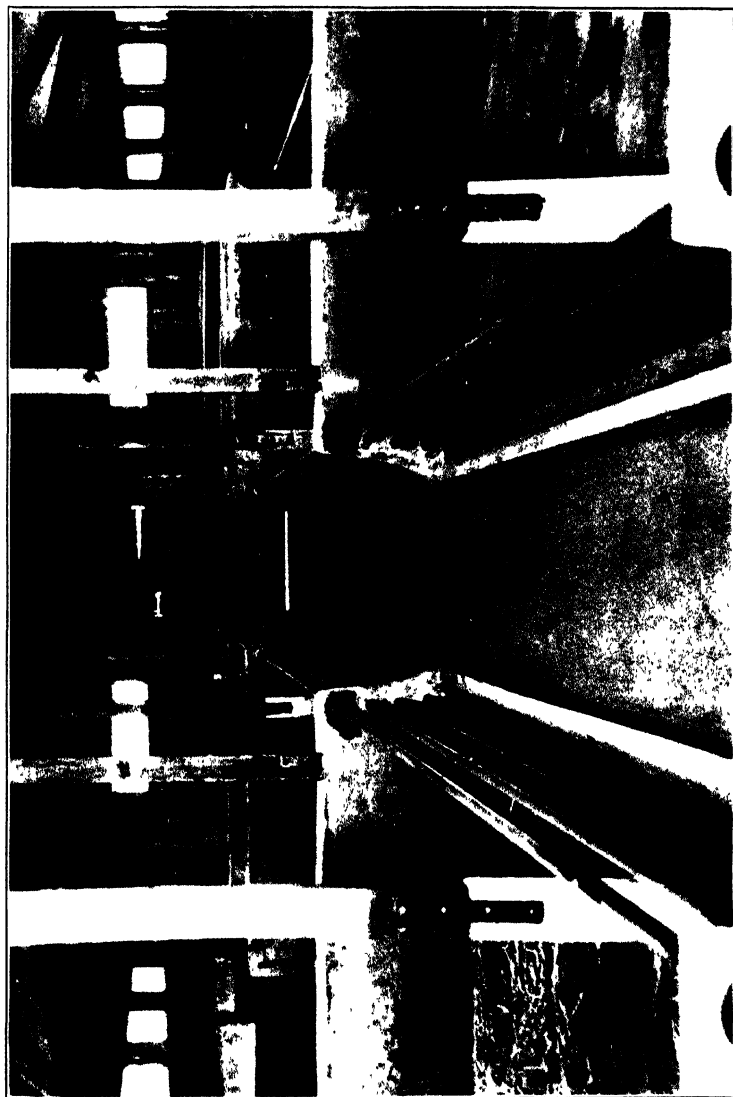


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Fig. 3 Interior of pig-fattening house on the Farleigh Estate



FIG. 4. Interior of pig-battening house on the Farleigh Estate, showing food-conveying truck (in passage) and
lifting machine (in right background)

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THE FATTENING OF BACON PIGS

manure. This is contrary to thrift, and to the law and the scriptures of agricultural academies. But he has never yet seen the farm of any size in which the liquid manure tank was anything but a symbol of good intentions. Something always occurs which makes the men too busy to use it, until the neighbours and the sanitary inspector complain.

In all the houses, the pigs are fed by the same method. There are one or two concrete mixing tanks, with a drain at the bottom for cleaning out and preventing the food becoming sour. The troughs are in two long lines with a feeding passage in the middle. The partitions between the pens are made so as to be lifted, and thus, after feeding, the whole length of troughs can be washed down.

The writer has improvised a half-cylinder on a trolley for feeding purposes. This travels the length of the passage on wheels and can be steered. The mixture is put in direct from the mixing tank, and a cock at the bottom fills the bucket, so that feeding is a quick affair with no waste from spilling, and no loss of labour in carrying buckets to and from the mixing tank. On this system, one man can feed 160 pigs in twenty minutes.

In the final finishing house, there is a weighing machine (Fig. 4). It is efficient and easy to work, the baconer being driven in from the dunging passage and coming out on the feeding passage to return thence to his pen. The weighing machine is most important, as the weight of pigs can be very deceptive, even to the expert. Without one, it is very easy to send pigs off overweight, and lose time, feed and grading bonus. It pays for itself very soon.

One practical point to be remembered in putting up a pig house is that the pigs kept indoors will always gnaw resinous wood, whatever minerals they may be given. Thus, wherever the pig can reach hard wood, concrete or galvanized iron should be used for upright partitions and outer walls. Concrete and iron-piping partitions are probably the soundest from the hygienic point of view. Above this level, for the outer walls, there should be weatherboarding lined inside with matchboarding. The writer uses a tar-spraying machine on all his woodwork for preservation purposes.

There are many variations on the type of houses described, but, speaking from personal experience, the writer has found these houses shorten the fattening period, over other methods, by a good month to six weeks. This

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alone makes more than enough saving to pay interest, and, on the capital cost, to provide for early redemption of the capital. Their capital cost is just over £3 per pig. The unit on a large farm which would seem most economical is the three houses. The house for the stores is for about 140 pigs; those for the finishing pigs, about 160 each. Thus, while the houses are not fully occupied the year round, there should be a throughput of 600 to 700 pigs for bacon. To keep to this throughput, between sixty and seventy sows and gilts are required. One man, an assistant and a boy are capable of managing the whole. A larger unit might pay but is too centralized from the point of view of manuring, and, if one breeds the stores, for the outdoor running of the sows. Also, the greater the concentration of pigs, the greater is the risk of disease.

A smaller unit, which might be economic for the family farmer, is dangerous to the larger farmer. Pigs must be fed and bred by those knowing their job, and three men make it possible always to be sure that in case of accident, sickness or labour difficulties, there is someone who knows the job to carry on.

Such a unit also makes it possible to pay the pigmen, or head pigman of the unit, by results, so as to have an interested partner. It is a very responsible job for a man, who may have to lose his job in bad times. He should, therefore, benefit as a master craftsman from his own thrift and forethought in good times.

THE PLUM FRUIT SAWFLY AND ITS CONTROL

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THE Plum Fruit Sawfly (*Hoplocampa flava*, L.) is not a recent addition to the list of injurious insects. In 1909 Theobald¹ wrote, "During the last ten years the ravages of this sawfly have . . . been more marked than formerly." A Worcester correspondent to the (then) Board of Agriculture² stated, "The grubs are causing the plums to fall off to an alarming extent," and a correspondent from York wrote, "Quite one half of the plums were affected." The Board's entomologist, commenting on these observations, wrote, "There is no doubt . . . that this pest has been present in many parts of England for a long time and has repeatedly caused great damage."² In 1909, Dr. R. Stewart MacDougall gave a short account of the Plum Fruit Sawfly in this JOURNAL,³ and stated that, "The plum sawfly which has been recorded from different parts of the country is a very dangerous enemy . . . and efforts should be made to restrict the damage and prevent the spread of the pest."

At first, reports of injury by the Plum Fruit Sawfly came mainly from the south and west of England, but by 1912 its presence was noted in the damson-growing areas of Westmorland.⁴ Since that time the insect has been reported periodically as causing heavy losses in plum and damson plantations in various parts of the country.

In 1925, infestations were severe in the eastern counties and Petherbridge started a series of studies on the biology and control of the insect. Some of the observations have already been published^{5, 6}, and to these the reader is referred for a fuller account of the recent research on the species.

The Adult Sawflies.—The sawflies (Fig. 1) are brownish-yellow with cloudy wings, and appear about the time plums

¹ Theobald (1909): *Insect Pests of Fruit*, Wye.

² This JOURNAL, August, 1909, p. 389.

³ "Theobald, *Rept. Econ. Zool.*, S.E. Agric. Coll., 1913, pp. 38-9.

⁴ Theobald, *Rept. Econ. Zool.*, S.E. Agric. Coll., 1913, pp. 38-9.

⁵ Petherbridge, Thomas & Hey: *Ann. Appl. Biol.*, XX, 1933, pp. 429-38.

⁶ Miles, Thomas & Hey: *Ann. Appl. Biol.*, XX, 1933, pp. 722-30.

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and damsons are in blossom. The date of their appearance varies from year to year. Records show that the sawflies have been found about the trees from March 31 until May 11, or throughout the blossoming period. The insects are found about the blossom trusses. They are very active in bright sunshine, but in dull weather they remain motionless for long periods among the flowers. When disturbed they fold legs, wings and antennæ close to the body and drop to the ground, where they are difficult to detect among the fallen brown blossom-bud scales. Males and females appear to be equally numerous, but males are smaller and have certain black markings on the back behind the head.

Egg Stage and Incubation.—The female lays its eggs in the fleshy base of the calyx (Fig. 2) in incisions cut by the saw-like ovipositor (Fig. 3). At first the eggs are completely hidden, but during incubation they swell considerably and become visible. The period of incubation appears to be 12-15 days in a normal season, though there are records of eggs requiring a much longer time to hatch. During the period of incubation of the sawfly eggs, the fruits set and swell rapidly, the petals fall and the calyx gradually dries.

The Larval Stage and Mode of Attack.—By the time the eggs hatch, plums are about one-fifth of an inch long and damsons slightly smaller. The larvæ bore straight into the young fruits, usually near the tip and often under the shelter of the shrivelling calyx. Since the newly-hatched larvæ are only about one-sixteenth of an inch in length, they make very small entrance holes that are, at first, greenish but soon turn brown and later black. Usually only one larva occurs in a fruit. The larva tunnels towards the developing stone and eats a cavity in the middle of the fruit.

After a few days, the insect leaves the fruit, usually at night, and enters another, the entrance holes occurring anywhere on the side of the fruit but most commonly near the tip. The larva again tunnels directly towards the stone and feeds partly on the stone and partly on the flesh, making a large, dark-coloured cavity containing excrement and gummy exudate. By this time, the insect measures nearly a quarter of an inch in length and has a whitish, wrinkled body and a dark head (Fig. 4). In a few days, further migrations take place.



FIG. 4. Adults of the Plum Fruit Sawfly.
Left: Male. Right: Female.



FIG. 2.—Egg of Plum Fruit Sawfly in position in calyx.



Copyright Photo H. W. Miles

FIG. 3. The "Saw" or ovipositor of the Plum Fruit Sawfly.

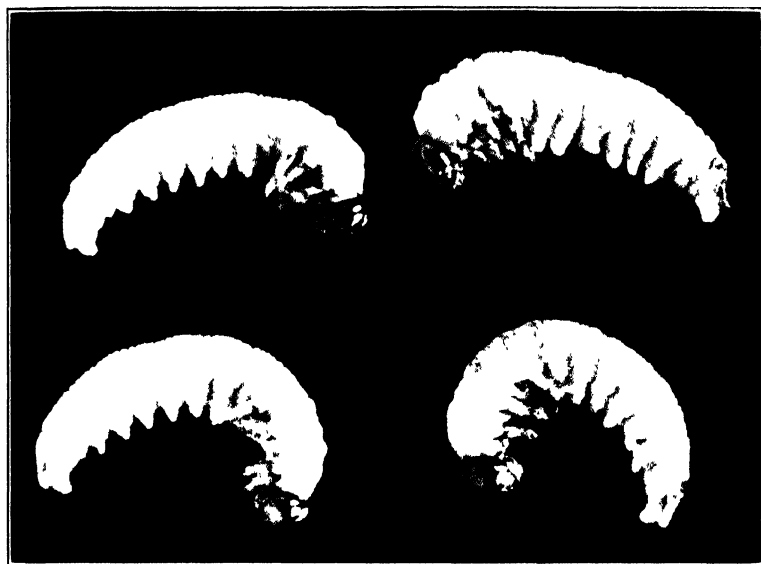
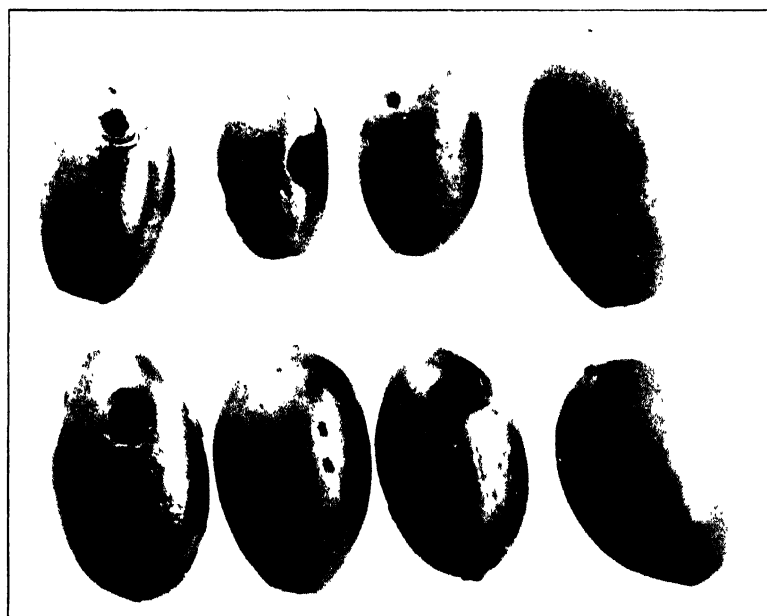


FIG. 4. Larva of the Plum Fruit Sawfly



Copyright Photos: H. W. Miles

FIG. 5. Young Plums showing injury by the Plum Fruit Sawfly

THE PLUM FRUIT SAWFLY

The larvæ grow rapidly and migrate from fruit to fruit in the course of feeding. The feeding stage lasts four to five weeks, and during that time each larva destroys the young fruits at the rate of about one each week. When fully grown, the larva is about half an inch long with a large yellowish-brown head and a deeply wrinkled whitish body, true legs on the first three body segments and false legs on segments Nos. 5-10 inclusive and on No. 13. The mature larvæ leave the fruit and find their way into the soil.

Damaged fruits (Fig. 5) usually fall to the ground. Many split open during infestation and reveal the blackening interior and gummy secretions. Occasionally the larvæ become caught in the gum and perish inside the fruits.

Cocoons and Hibernation.—The larvæ move about in the soil until they find suitable sites in which to make their cocoons. The majority construct cocoons at a depth of from 2 to 9 in., though a few larvæ penetrate deeper. The cocoons are about one-fifth of an inch long, oval, and of tough, brownish, parchment-like material. Soil particles adhere to the outside and make the cocoons difficult to detect in the soil. Within the cocoons, the larvæ contract and pass into a dormant condition that continues through the summer and winter until the following spring. Towards the middle of March the last larval skin is shed and the insects become chrysalids or pupæ; and, about three weeks later, the adult insects struggle out of the thin transparent pupal skin. After their bodies harden slightly they bite their way out of the cocoons, travel upwards through the soil and emerge into the open air about the time that plums and damsons are beginning to blossom. As with Apple Sawfly, a small proportion of Plum Sawfly larvæ remain in the cocoons a second season and emerge a year later than others of their generation.

The following table indicates the time at which the various stages of the Plum Fruit Sawfly can be found about the host trees.

TABLE I

<i>Insect.</i>	<i>Time of Occurrence.</i>	<i>Usual Dates.</i>	<i>Position on Host Plant.</i>
Adult stage	Blossoming period	Apr. 20-May 10	In blossom
Egg stage	Blossoming period	Apr. 24-May 14	In calyx
Larval stage	Between petal fall and shedding of calyx	May 15-July 5	In fruit
Cocoons	About midsummer	Mid-June to early April	In soil

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Susceptibility of Varieties.—There is a good deal of difference in the extent to which different varieties are attacked by Plum Fruit Sawfly. In Cambridgeshire and Huntingdonshire,⁵ "Czar" and "Victoria" suffered more severely than early-flowering varieties like "Monarch" and late-flowering varieties like "Pond's Seedling"; and infestations of over 50 per cent. were frequently observed. Observations in North Lancashire, in 1934, also showed that early-flowering varieties suffered less than the mid-season varieties. Table II gives particulars of the extent of infestation of seven representative varieties in the order of flowering.

TABLE II

<i>Variety.</i>	<i>No. of Fruits examined.</i>	<i>No. of Fruits infested.</i>	<i>Percentage of Infestation.</i>
Monarch	442	2	under 1
Rivers' Early	515	3	under 1
Victoria	407	76	18.6
Damson	395	174	44.0
Czar	436	124	28.4
Belle de Louvaine	390	39	10.0
Pershire	298	22	7.3

Although damsons are shown to have suffered much more severely than other varieties, it is probable that generally they are no more susceptible to attack than "Victoria" or "Czar." In 1934, in the plantation where the observations were made, the weather was warm and sunny and sawflies abundant during the time the damsons were in blossom. Moreover, the damsons were massed and predominated in the plantation, and the profusion of damson blossom probably attracted the insects in greater numbers than did the other varieties dispersed about the plantation.

Spraying for the Control of Plum Fruit Sawfly.—Experiments in Germany⁷ indicated that some control might be obtained by spraying 8 days after petal fall and again 8 days later with a lead arsenate and nicotine sulphur spray. Petherbridge⁵ also obtained promising results in 1933 with two applications of a spray containing lead arsenate, nicotine sulphate and a spreader, but obtained inconsistent results from the use of nicotine and soft soap spray, although, in 1929, a single application of this spray reduced infestation on "Czar" from 11 per cent. to about 2 per cent.

In North Lancashire, trials were carried out using two

⁷ Sprengel, *Zeits. für ange. Entom.*, XVI, 1930, 1.

THE PLUM FRUIT SAWFLY

applications of a spray containing 8 oz. nicotine and a spreader in 100 gal. water. Observations showed that sawflies were present in greatest numbers from May 2 to 11, and that eggs began to hatch on May 19, about 9 days after petal fall. The first application of the spray was made on May 21, two days after hatching began, and a second application followed on May 25, four days after the first. An examination of the fruits was made on June 18, and the results are recorded in Table III:—

TABLE III

Variety	Sprayed Trees			Unsprayed Trees		
	Total Fruits Examined	Number Infested	Per cent. Infested	No. Fruits Examined	Number Infested	Per cent. Infested
Victoria ..	543	17	3.1	497	76	18.6
Damson ..	452	46	10.2	395	174	44.0
Belle de Louvaine	444	26	5.8	390	39	10.0
Pershore ..	277	7	2.5	298	22	7.3

The figures for the four varieties show that a marked reduction in infestation by Plum Fruit Sawfly followed the use of nicotine spray. It seems likely, therefore, that, as with apple sawfly, applications of nicotine wash at the right time will yield a satisfactory measure of control. Spraying operations should be accurately timed to coincide with the hatching of the eggs since only a small proportion of the eggs become exposed during incubation, and not over 90 per cent. as with apple sawfly (*H. testudinea*, Klug.). As a result of observation in 1934, the time recommended for the application of the spray is about 10 days after petal fall, and two applications within a week appear advisable. Nicotine sulphate, as used by Petherbridge, may prove more satisfactory than nicotine and spreader because of its more lasting effect. It is probable, however, that the most important factor in successful control of the insect will be the time of application of spray, and sprays applied too early or too late are likely to give disappointing results.

The writer is greatly indebted to Mr. W. L. Steer of the Lancashire Horticultural Staff for his help in arranging the trials and for his assistance in making the counts. He is also grateful to Mr. Edmondson, of Silverdale, for granting facilities for the experiments and observations.

THE WEED FLORA OF LUCERNE IN EAST ANGLIA

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THE development of lucerne-growing in the Eastern Counties, especially in connexion with the manufacture of meal, has provided an opportunity for the study of the weed flora associated with the crop.

An examination of the weed population is important from two aspects: (1) it is well known that lucerne is very intolerant of weed competition during establishment, so that clean land is essential to success; and (2) where alfalfa meal is manufactured, an admixture of weeds with the crop results in an impure sample of meal to an extent proportionate to the quantity of weeds present. This also applies where lucerne is grown for forage on the farm, except that there is then no responsibility under the "Fertilizers and Feeding Stuffs Act."

In many respects the weeds found in lucerne on light soils appear to resemble those in sainfoin, but the writer has not made a detailed investigation of the latter crop and one cannot rely on cursory observation.

To some extent the weeds found in temporary leys in the Eastern Counties are like those in lucerne. Most notable in this respect are the Wild Carrot (*Daucus carota*) and the White Campion (*Lychnis alba*).

It is not until the second year of the crop's growth that the characteristic weeds are evident: in the first year the common annual and perennial weeds of arable land are predominant.

The Weeds found in Lucerne.—The following data are based on a general survey of lucerne crops observed on the light and chalky soils of Norfolk and parts of Suffolk. The detailed observations were carried out on two holdings in Norfolk, where the area under this crop has increased greatly in recent years, Essex, Kent, Norfolk and Suffolk accounting for the bulk of the lucerne grown in this country. The following notes and observations do not apply to heavy land, nor to districts of high rainfall, but

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the crop is most frequently grown upon the sandy and chalky soils.

In most instances the lucerne was drilled without an accompanying "seeds" mixture, but when a "seeds" mixture was used the proportion of weeds appeared to be greatly reduced in comparison with adjoining land where no "seeds" were drilled. The influence of the seeds mixture upon the lucerne was not always to the advantage of the latter, depending largely upon the mixture used. This matter will be referred to later.

Observation indicates that the weeds associated most frequently with lucerne grown on light and chalky soils are White Champion (*Lychnis alba*), Wild Mignonette (*Reseda lutea*), Wild Carrot (*Daucus carota*), Musk Thistle (*Carduus nutans*) and Viper's Bugloss (*Echium vulgare*).

It is generally agreed that White Champion is the most characteristic weed of lucerne. No field of the crop has been found by the writer to be entirely free from this weed.

The White Champion is common to lucerne, sainfoin and temporary leys, and is easily the most abundant of the five species named. In bad infestations an average of five plants per square yard has been noted.

This weed is a biennial and appears to be characteristic of the poorer soils.

Wild Mignonette is also a biennial, but is not so ubiquitous as White Champion and occurs on sandy and chalky soil, not appearing to tolerate acidity. Where it occurs, however, it is present in fairly dense patches or covering the whole field. Nothing appears to be known as to its palatability or nutritive qualities.

The density of the species, where it is present, is greater than that of White Champion, and an average abundance of seven plants per square yard may often be recorded. In such circumstances it may dominate the field as the branches tend to be somewhat loose and spreading in habit.

Wild Carrot is fairly constant as a weed in lucerne crops, though it does not appear to be so frequent, nor to assume such proportions as in temporary leys. This may be because it takes two years to reach its maximum height growth, and like other species of its natural order it is very sensitive to aspect and cannot tolerate light competition. In temporary leys it is not much in evidence in the maiden seeds though the plants may be seen close to the ground. It is a biennial and flowers in the second year of the crop. If the grass is cut early the weed diminishes greatly in the following year if the ley is of more than one year's duration. The leaves have a feeding value not much below that of lucerne, and are, in fact, higher in mineral matter than the latter.

Viper's Bugloss is a biennial that is very abundant on dry, sandy soils, and is frequently associated with lucerne, though somewhat restricted in distribution. On the blowing sands of south Norfolk and Suffolk it is as frequent in the lucerne crops as White Champion. Natives of this district assert that in certain seasons Viper's Bugloss dominates Wild Champion, while in others the position is reversed. In this way they refer to "white summers" and "blue summers."

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Whether this supposed phenomenon has any relation to weather conditions has not been determined.

Viper's Bugloss has been regarded with suspicion as having poisonous properties, but no definite evidence has been produced to confirm the possibility.^{1*} The coarse prickly nature of the plant suggests a high fibre content and low feeding value. Many weeds are not strictly poisonous, but act as mechanical irritants. Grinding into meal should obviate this possibility.

Musk Thistle is also biennial and is abundant on dry calcareous soils, but not common on other soil types. The density of occurrence is not high, and even in strong colonies one plant per square yard is the average. The plants are large and bulky, covering a good deal of ground. The very prickly nature of the stems and leaves renders it inedible in the green state or as hay.

Miscellaneous Species.—Several species that occur in lucerne crops may be classed as miscellaneous. *Docks* are often present, though not to the same extent as on heavy soils. In the instances under observation they occurred mainly on the site of manure heaps or in the neighbourhood of gateways.

In some districts on very dry soil, especially where the crop is thin, Brome grasses (*Bromus sterilis* and *Bromus squarrosus*) often prove troublesome.

Annual Meadow Grass (*Poa annua*) frequently forms a carpet over the ground and may reach a height of about eight inches. It does not appear to exert any suppressing influence upon the crop. It is most evident in early spring before the lucerne begins to grow, and its transient nature is well known. It covers the ground in the absence of other overshadowing species. The complete life of this grass may occupy as little as five weeks. It thus quickly becomes suppressed only to reappear again when conditions become favourable. One cannot, in the light of these facts regard annual Meadow Grass as of much consequence.

Bindweed (*Convolvulus arvensis*) is frequently present, but has not been noted as a serious weed in this survey.

The Creeping Thistle (*Cirsium arvense*) may be troublesome in some instances.

Species in Relation to Cultivation.—If it is accepted that the principal five species of weeds mentioned above are most frequent in the second year and under the conditions described, it remains to discover an explanation for the phenomenon. It might be argued that these weeds are indigenous to sandy and chalky lands and that as the observations were carried out upon such soils the association may be explained by this fact only. Such an explanation is discounted by the fact that adjacent fields under other cropping possess a different weed flora. The crops examined in immediately-adjoining fields were wheat, barley, oats, flax and sugar-beet.

In the cereals none of the five weeds could be found except as casuals. The dominant species were Poppy (*Papaver rhoeas*), Creeping Thistle (*Cirsium arvense*), Charlock (*Brassica arvensis*), Wild Radish (*Raphanus raphanistrum*).

* For references see page 140.

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trum) and Bindweed (*Convolvulus arvensis*). The same species were present in the flax, but also a fair number of plants of Knapweed (*Centaurea nigra*).

The beet crops were very clean and well cultivated, but a few Creeping Thistles were present, together with Fat Hen (*Chenopodium album*) and Creeping Orache (*Atriplex*, spp.).

It is suggested that the only explanation can be found in a consideration of the cultivation of lucerne, which is the only arable crop, other than temporary leys and sainfoin, where the soil is undisturbed to any extent for more than one season. This allows biennial species to complete their life cycle without cultural interference.

Brenchley has laid great stress upon the influence of cultivations upon weed communities.² It is a remarkable fact that all the five characteristic species of the lucerne crop are biennials, and when one considers that only approximately 8 per cent. of about one hundred most common British weeds of arable land are biennials,³ the facts can hardly be mere coincidence.

It should be noted that the biennials mentioned above may under certain conditions behave as annuals, but they never become perennials. In this connexion it was reported that Wild Mignonette was present to a certain extent in crops of lucerne in the first season, but that it had increased greatly in the second.

An interesting confirmation of the theory that biennial weeds are present in lucerne owing to the two seasons immunity from cultivation was observed in a large field of barley at Weeting in Norfolk. The barley crop was nearly ripe, and narrow parallel strips of Viper's Bugloss ran the full length of the field, the blue flowers showing in striking contrast with the yellowing barley. The strips were only about one plant in width and the distance between the strips was exactly 11 yd. The crops in the preceding year had been one of turnips on one part of the field and oat and vetch mixture on the other. This crop was fed off on the field by sheep and finally tractor-ploughed. In ploughing the field a strip of about 4 in. in width had been left unploughed on the crown of each of the ridges and had thus been undisturbed for two seasons. A similar strip ran the length of the headlands along the crown of the headland ridge, at right angles to the main strips.

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Weed Sequence in Lucerne.—It is always stressed that lucerne should be sown on clean land, as it will not tolerate weed competition. This advice has long been appreciated by practical growers, for the crop is usually allocated to the cleanest land on the farm: it is not called upon to face such intense weed competition as other crops, especially in regard to perennial weeds.

The weeds found in lucerne appear to follow a regular sequence on sandy and chalky soils. In the first year of growth there is a community of annual weeds such as would characterize other arable crops of one season's duration. In conjunction with the annual weeds are such perennials as Docks and Creeping Thistle, which may be present in the land before drilling. The biennial weeds are only present in their "maiden" state, though a small proportion of them may develop in their first year.

In the second year of growth the annual species are suppressed by the taller lucerne, which exerts a smothering effect—provided always that the crop has not failed or is not weak in growth. At this time the biennials will have reached maturity and owing to their tall and strong habit are not suppressed. There is thus a phase, during the second year of the crop, when biennials exert a strong competitive influence. This is at a critical stage in the growth of lucerne and if these weeds are present in serious quantity they may result in crop failure.

In the third and subsequent years biennials usually disappear and give place to perennials. In the first year of the crop's growth the seedling and maiden biennials were not suppressed because the lucerne was undeveloped. When in its third year it has become taller and leafy both annuals and biennials will dwindle in numbers except on the thin patches in the crop.

The third phase in the weed sequence is that of perennial weeds and the magnitude of this phase may depend largely on the comparative freedom of the land from perennial species at the time of drilling the seed.

Prevention and Eradication.—It is generally recommended that lucerne should be drilled and not broadcast. The former practice allows horse hoeing to be carried out and in this way annual weeds may be kept in check in the first season.

Where tall species such as docks, thistles, or "fat hen"

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assert themselves in the first year, spudding or hand pulling may be desirable.

The use of the horse hoe at the end of the first season may do much to destroy "maiden" biennials growing between the rows.

In cases where Bent (*Agrostis*, spp.) and Couch (*Agropyrum repens*) are present, it is best to withhold cultivation, and to graze and consolidate with sheep.

The runners of these weeds are entangled in the growing lucerne and while they are broken by implements they are not pulled out. Thus harrowing may greatly increase their proliferation.

On a certain large lucerne-growing concern drastic mechanical cultivation with pitch-pole harrows has been carried out in winter. An apparent decrease in weeds has resulted and there has certainly been no harmful result upon the crop.

It is believed by many growers that lucerne should not be grazed by sheep in late autumn. The writer has had experience of grazing and heavy folding of the crop with apparently beneficial results. Care was of course taken not to graze when there was any frost.

Hand pulling of biennials before seeding, or the taking of an early cut should prevent further seeding of these species. Observations suggest that there is no risk of seeding if the cut is taken before the first week in July.

Another aspect of the problem of weed control lies in the question of including grasses and clovers or simply a single species of either. There is no doubt that the inclusion of certain grasses exerts a remarkable control over weeds as compared with lucerne on bare ground; but it must be remembered that some grasses and clovers seriously handicap or even suppress the lucerne.

This problem of the establishment of lucerne in relation to individual grass and clover species sown with it, has been the subject of investigation in two extensive trials in Norfolk during the past two years. It is hoped that satisfactory findings will be reported in due course.

It is obvious that any species or mixture of species sown with the lucerne must not be tall and bulky enough to offer serious competition, or to form a large component where the crop is cut for drying and the manufacture of meal.

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Summary.—Biennial weeds are the most serious handicap to lucerne establishment on sandy and chalky soils.

Their presence is due to freedom from cultural disturbance offered by the crop, coupled with the absence of grass competition.

Annual and sometimes perennial weeds are the most serious competitors in the first year, while after the second year perennials are the dominant weeds.

Horse hoeing and even more drastic operations carried out at the right period of the year are the best cultural means of control.

Hand pulling or an early cut will prevent biennials from seeding.

A promising solution appears to lie in the inclusion of suitable grass or clover species when drilling the lucerne.

ACKNOWLEDGMENTS.—My thanks are due to Messrs. J. Bryce, R. McG. Carslaw, E. V. Garner and J. C. Mann for their kind information in connexion with many points in the above article.

REFERENCES.

- ¹ Long, H. C.: *Poisonous Plants on the Farm*, Ministry of Agriculture and Fisheries, Bulletin No. 75, p. 52.
- ² Brenchley, W. E. and Warington, K.: *Weed Seed Population of Arable Soil. II. Influence of Crop, Soil and Methods of Cultivation upon the Relative Abundance of Viable Seeds*, Jour. Ecol., Vol. XXI, No. I, Feb., 1933, p. 103.
- ³ Long, H. C.: *Weeds of Arable Land*, Ministry of Agriculture, Misc. Pub. No. 61.

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACT, 1934

NUMBER, WEIGHT AND PRICES OF CATTLE CERTIFIED FOR PAYMENTS

THE certification of cattle for payments under the Cattle Industry (Emergency Provisions) Act, 1934, has provided comprehensive information as to the numbers of fat cattle, of the classes and standards covered by the Scheme, which have been marketed throughout the United Kingdom since September 1, 1934. The classes of cattle in respect of which payments are made are steers, heifers and cow-heifers; a cow-heifer is defined as an animal which has calved, but which has grown not more than six permanent incisor teeth. The standard required from September 1 to December 31, 1934, was that the animal should have an estimated killing-out percentage of not less than 52 per cent., and from January 1, 1935, a killing-out percentage of not less than 54 per cent.

The numbers of cattle certified in the United Kingdom in each of the first six months of the Scheme have been as follows:—

			<i>Steers.</i>	<i>Heifers.</i>	<i>Cow-heifers.</i>	<i>Total.</i>
			<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
September, 1934	..	..	62,104	49,534	3,792	115,430
October, ..	..	..	69,276	58,462	4,592	132,330
November, ..	..	..	58,403	50,728	4,130	113,261
December, ..	..	..	63,638	51,083	3,832	118,553
January, 1935	..	..	82,093	51,869	4,953	138,915
February, ..	..	..	77,576	41,157	4,415	123,148
Total for 6 months ..			<u>413,090</u>	<u>302,833</u>	<u>25,714</u>	<u>741,637</u>

The rate of marketing of fat cattle from month to month as indicated by the above figures must be judged with some reserve. Many more fat stock markets are held on Monday than on any other day of the week, and, as the week proceeds, fewer fat stock markets are held each day until on Saturday the number is very small. Of the three months, September, October and November, while the total number of fat cattle sold in October was considerably higher than in September or November, the fact that October had five Mondays, Tuesdays and Wednesdays probably

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accounts very largely, if not altogether, for the larger number in that month. Speaking generally, it would appear that the rate of marketing was about the same in each of these three months. In view of the heavy marketings of fat cattle at the Christmas fat stock shows, it may be an occasion for surprise that no appreciable increase is shown in the figures for December; but the large numbers of cattle sold at the Christmas shows were counter-balanced by very small marketings in the subsequent weeks of December. When allowance is made for the shorter month of February, the sales in January and February appear to have been at much the same rate in each of the two months, and at a higher level than in the last four months of 1934 by about 8 or 9 per cent.

As regards animals certified at Live-Weight Certification Centres, which accounted for 724,723 of the total of 741,637 animals certified at both Live-Weight and Dead-Weight Centres, details of the numbers of each class of animal certified in each of the agricultural divisions into which the country is divided are given in the Table on pp. 144, 145. During the six months, September, 1934, to February, 1935, 467,040 cattle were certified in England, or $64\frac{1}{2}$ per cent. of the total in the United Kingdom; 53,134 cattle, or $7\frac{1}{2}$ per cent., in Wales; 156,741 cattle, or $21\frac{1}{2}$ per cent., in Scotland; and 47,808 cattle, or $6\frac{1}{2}$ per cent., in Northern Ireland.

The number of fat cattle placed on the markets in the different agricultural divisions in January and February usually shows appreciable variation from the numbers in the same divisions in the autumn. In the north-eastern division of England, which comprises Norfolk, Lincoln and the East Riding of Yorkshire, the numbers sold in January and February were much larger than in the autumn months, and the eastern and west midland divisions had much heavier marketings in January and February than in the previous autumn. On the other hand, the east midland division, which includes the counties of Leicester and Northampton with their large areas of feeding pastures, showed a sharp drop in the number of fat cattle marketed in February. On the eastern side of Scotland, the rate of marketing was heavier in January and February than in the previous four months, and increased marketings in January and February were even more pronounced in Northern Ireland.

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The relative numbers of fat steers and heifers sold showed comparatively little variation from month to month from September to December, though there were small decreases in the proportion of steers in October and November and corresponding increases in heifers. In the four autumn months heifers accounted for about 43 to 45 per cent. of the certified cattle, and steers for about 51½ to 54 per cent., but the percentage of heifers fell to 37 in January and 33 per cent. in February, steers accounting for 59 per cent. in January and 63 per cent. in February. The proportion of cow-heifers in the total of certified cattle has been only between 3 and 4 per cent. each month. The following Table shows the percentages of each class of cattle certified in each month:—

		<i>Steers.</i>	<i>Heifers.</i>	<i>Cow-heifers.</i>
		%	%	%
September, 1934	..	53·8	42·9	3·3
October, ..	..	52·4	44·2	3·4
November, ..	..	51·6	44·8	3·6
December, ..	..	53·7	43·1	3·2
January, 1935	..	59·1	37·3	3·6
February, ..	..	63·0	33·4	3·6

The detailed Table shows that much the larger proportion of the cattle fattened both in summer and winter in the eastern, north-eastern and east-midland divisions of England, in North Wales, in all parts of Scotland, and in Northern Ireland, are steers; whilst in the northern division of England considerably more heifers than steers are fattened on the grass. In the north-western division of England appreciably more heifers than steers were sold in each month.

The total number of animals certified at Dead-Weight Certification Centres in the six months was 16,914. The numbers certified each month in England and Wales and Scotland respectively, were as follows (there are no Dead-Weight Centres in Northern Ireland):—

		<i>England and Wales.</i>	<i>Scotland.</i>	<i>Great Britain.</i>
		No.	No.	No.
September, 1934	..	1,828	345	2,173
October, ..	..	2,474	623	3,097
November, ..	..	2,199	616	2,815
December, ..	..	1,803	415	2,218
January, 1935	..	2,950	631	3,581
February, ..	..	2,684	346	3,030
Total for six months		<u>13,938</u>	<u>2,976</u>	<u>16,914</u>

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACT

NUMBER OF CATTLE CERTIFIED FOR PAYMENT UNDER THE CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACT AT LIVE-WEIGHT CERTIFICATION CENTRES IN EACH MONTH FROM SEPTEMBER, 1934, TO FEBRUARY, 1935.

AGRICULTURAL DIVISIONS	STEERS.					HEIFERS						
	Sept.	Oct.	Nov.	Dec.	Jan.	*Feb.	Sept.	Oct.	Nov.	Dec.	Jan.	*Feb.
East ..	3,534	3,129	2,617	3,306	3,879	4,024	1,946	2,033	1,839	2,147	2,416	2,061
North-East ..	7,083	6,513	4,627	5,623	9,569	10,810	2,276	2,313	1,967	2,057	2,563	2,451
ENGLAND ..	1,417	1,631	1,187	1,992	1,713	1,392	1,855	2,136	1,863	2,311	2,216	1,854
East Midlands ..	7,469	8,323	7,109	6,221	6,639	4,729	5,655	6,599	5,284	1,944	4,668	3,087
(excluding Monmouth)	2,666	3,492	2,974	4,010	5,148	1,731	3,889	5,077	4,078	4,563	5,524	4,528
West Midlands ..	3,457	3,877	3,366	3,860	4,131	3,900	3,542	4,342	4,334	4,763	4,635	3,977
South-West ..	6,147	7,617	6,878	7,329	10,766	11,039	11,512	12,611	10,399	8,590	6,781	5,262
North ..	3,035	3,880	2,980	3,184	3,392	3,268	7,147	8,399	6,934	6,490	6,081	4,603
North-West ..	34,808	38,462	31,738	35,525	45,537	43,983	37,822	43,500	36,698	35,874	34,984	27,823
TOTAL ..	1,556	2,597	2,387	2,645	3,135	2,577	1,126	1,714	1,642	1,823	1,665	1,161
WALES ..	1,289	2,220	2,094	2,440	2,476	2,359	1,776	2,946	2,721	2,686	2,625	1,903
(including Monmouth)	2,845	4,817	4,481	5,085	5,611	4,936	2,902	4,660	4,363	4,509	4,290	3,064
North-East ..	1,110	3,998	3,915	4,654	4,778	4,376	3,277	3,408	3,329	4,006	4,387	3,732
East Central ..	5,222	5,188	3,933	4,764	5,259	5,649	560	645	561	909	1,043	1,186
South-East ..	3,969	4,641	3,824	3,816	5,084	4,249	286	391	337	333	499	367
West & South-West ..	3,964	4,662	3,939	3,985	4,831	4,150	1,992	2,439	1,955	2,077	1,958	1,368
North & North-West ..	693	600	568	687	713	686	356	337	434	483	561	464
TOTAL ..	17,958	19,089	16,179	17,906	20,665	19,110	6,471	7,220	6,619	7,808	8,448	7,111
NORTHERN IRELAND TOTAL ..	5,178	5,162	4,510	3,919	8,043	7,542	1,531	1,816	1,848	1,949	2,937	2,250
TOTAL: UNITED KINGDOM ..	60,789	67,530	56,908	62,435	79,856	75,571	48,726	57,196	49,528	50,140	50,659	40,248

The Agricultural Divisions comprise the Counties of:

ENGLAND—
EAST: Bedford, Huntingdon, Cambridge, Suffolk, Essex, Hertford, Middlesex and London.
NORTH-EAST: Norfolk, Lincoln and York, East Riding.
SOUTH-EAST: Kent, Surrey, Sussex, Berkshire and Hampshire.
EAST MIDLAND: Northampton, Bedford, Rutland, Northampton, Buckingham, Oxford and Worcester.
WEST MIDLAND: Salop, Worcester, Gloucester, Wiltshire and Hereford.
SOUTH-WEST: Somerset, Dorset, Devon and Cornwall.
NORTH: Northumberland, Durham and York, North and West Ridings.
NORTH-WEST: Cumberland, Westmorland, Lancaster, Chester, Derby and Stafford.

WALES—

NORTH: Anglesey, Caernarvon, Merioneth, Montgomery, Denbigh and Flint.
SOUTH: Cardigan, Radnor, Brecon, Monmouth, Glamorgan, Carmarthen and Pembroke.

SCOTLAND—
NORTH-EAST: Nairn, Moray, Banff, Aberdeen and Kincardine.
EAST CENTRAL: Angus, Perth, Fife, Clackmannan and Kinross.
SOUTH-EAST: West Lothian, Midlothian, East Lothian, Berwick, Roxburgh, Selkirk and Shetland.
WEST AND SOUTH-WEST: Argyll, Bute, Dumfries, Kirkcubright and Wigton.
NORTH [AND NORTH-WEST]: Renfrew, Ayr, Dumfries, Kirkcubright and Wigton.
NORTH [AND NORTH-WEST]: Zetland, Orkney, Caithness, Sutherland, Ross and Cromarty, and Inverness.

* Subject to revision

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACT

NUMBER OF CATTLE CERTIFIED FOR PAYMENT UNDER THE CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACT AT LIVE-WEIGHT CERTIFICATION CENTRES IN EACH MONTH FROM SEPTEMBER, 1934, TO FEBRUARY, 1935—(continued).

AGRICULTURAL DIVISIONS	COW-HEIFERS						TOTAL					
	Sept.	Oct.	Nov.	Dec.	Jan.	*Feb.	Sept.	Oct.	Nov.	Dec.	Jan.	*Feb.
ENGLAND												
East ..	72	150	187	169	144	114	5,552	5,332	4,643	5,622	6,439	6,199
North-East ..	172	149	100	114	105	139	9,531	8,975	6,694	7,794	12,297	13,400
South-East ..	125	171	134	123	159	133	3,397	3,938	3,184	4,426	4,088	3,379
East Midlands ..	512	558	308	285	349	249	13,636	15,450	12,791	11,450	11,656	8,065
West Midlands (Monmouth) ..	295	342	263	247	366	339	6,850	8,911	7,315	8,820	11,038	9,598
South-West ..	473	631	621	545	826	772	7,472	8,850	8,321	9,168	9,992	8,739
North ..	596	674	604	587	676	611	18,255	20,902	17,881	16,506	18,223	16,912
North-West ..	893	1,029	935	862	1,198	1,030	11,075	13,308	10,849	10,545	10,671	8,901
TOTAL ..	3,138	3,704	3,242	2,932	3,883	3,387	75,768	85,666	71,678	74,331	84,404	75,193
WALES												
North ..	41	56	83	83	95	94	2,723	4,367	4,112	4,551	4,895	3,832
South ..	110	186	176	168	252	227	3,175	5,352	4,991	5,294	5,353	4,489
TOTAL ..	151	242	259	251	347	321	5,898	9,719	9,103	9,845	10,248	8,321
SCOTLAND												
North-East ..	97	101	91	76	77	81	7,484	7,507	7,338	8,736	9,242	8,189
East Central ..	21	38	23	38	34	34	5,806	5,871	4,520	5,711	6,336	6,863
South-East ..	7	12	17	21	22	20	4,262	5,044	4,178	4,173	5,005	4,636
West & South-West ..	190	250	214	229	197	155	6,146	7,351	6,108	6,291	6,986	5,673
North & North-West ..	21	21	21	16	9	15	1,070	958	1,023	1,186	1,283	1,165
TOTAL ..	339	422	369	383	339	305	24,768	26,731	23,167	26,097	29,452	26,526
NORTHERN IRELAND TOTAL ..	114	139	140	191	250	286	6,823	7,117	6,498	6,062	11,230	10,078
TOTAL: UNITED KINGDOM ..	3,742	4,507	4,010	3,760	4,819	4,249	113,257	129,233	110,446	116,335	135,334	120,118

* Subject to revision

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACT

Average Weight of Fat Cattle.—The average live-weight at which fat cattle have been marketed over the whole of the United Kingdom in the six months has been 9 cwt. 2 qr. 8 lb. The cattle marketed in December were rather heavier than in any of the other five months for which the figures are available, the average live weights for each month being September, 9 cwt. 2 qr. 3 lb.; October, 9 cwt. 1 qr. 21 lb.; November, 9 cwt. 1 qr. 23 lb.; December, 9 cwt. 2 qr. 24 lb.; January, 9 cwt. 2 qr. 19 lb.; and February, 9 cwt. 2 qr. 12 lb. In Northern Ireland the average is about 1 cwt. lower than in Great Britain. The heaviest cattle are marketed in Scotland. The average live weights for the whole period of six months are:—England and Wales, 9 cwt. 2 qr. 10 lb.; Scotland, 9 cwt. 3 qr. 2 lb.; and Northern Ireland, 8 cwt. 2 qr. 14 lb.

The dressed carcass weights of the animals certified at Dead-Weight Certification Centres have averaged 601 lb.; the average weight of those certified in Scotland was 617 lb., and in England and Wales 598 lb.

Average Prices of Fat Cattle.—The prices of fat cattle suffered the usual decline in the autumn of 1934; advanced at the Christmas sales in December; but declined from the December level in January and February, 1935. The average prices of certified cattle over the six months were 4s. 1d. per live cwt., higher in Scotland, and 3s. 9d. per live cwt., lower in Northern Ireland, than in England and Wales. The following Table shows the average prices per live cwt. in each country and in the United Kingdom as a whole:—

		<i>England and Wales.</i>		<i>Scotland.</i>		<i>Northern Ireland.</i>		<i>United Kingdom.</i>	
		<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
September, 1934	..	37	0	40	10	33	7	37	9
October, ..	..	34	10	38	11	31	3	35	7
November, ..	..	33	9	38	8	30	1	34	7
December, ..	..	35	5	39	7	30	10	36	0
January, 1935	..	35	2	39	0	31	3	35	10
February, ..	..	33	8	37	2	30	10	34	3
Average for 6 months		34 10		38 11		31 1		35 7	

The average price per cwt. dressed carcass weight of the cattle certified on a dead-weight basis over the period of six

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months was 63s. 4d., and the monthly average prices per cwt. were as follows:—

			s.	d.
September, 1934	..	..	67	3
October, „	..	..	65	0
November, „	..	..	62	9
December, „	..	..	61	7
January, 1935	..	..	62	11
February, „	..	..	61	8
Average for six months			63	4

It will be seen that the trend of average prices of live animals and of carcasses is similar, though the Christmas increase in dead-weight prices is not so apparent and does not show until January. This may be due, to some extent at least, to the fact that, in dead-weight certification, certificates cannot be made available to the Committee immediately after sale as is the case in live-weight certification.

THE PIGMY MANGOLD BEETLE: A SERIOUS PEST OF SUGAR-BEET AND MANGOLD CROPS

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OF the common insect pests that attack mangolds and sugar-beet, none is more destructive in the early growth stages of these crops than the Pigmy Mangold Beetle (*Ato-maria linearis*, Steph.). Where a severe attack occurs, it is by no means uncommon for 70 per cent. of the plants to die, and for the remainder to be so stunted in growth that their feeding or market value is greatly reduced. The extent of the financial loss inflicted by this beetle is not generally realized, for the damage is often erroneously ascribed to other causes, such as inclement weather, faulty germination, wireworm attack, manurial deficiency or some unsuitable soil condition. Serious outbreaks of this pest have been reported during recent years* from Yorkshire, Derbyshire, Shropshire, Herefordshire, Nottinghamshire, Lincolnshire, Norfolk, Suffolk, Cambridge, Huntingdonshire, Northamptonshire, Buckinghamshire, Oxford, Wiltshire, Somerset, Cornwall, Devon, Dorset, Hampshire, Sussex and Kent.

In view of these circumstances, an extensive study of the beetle on sugar-beet and mangolds was begun by the writer in 1927, and continued over a period of six years. It involved, in addition to laboratory studies, general field observations of infested areas both in Lincolnshire and Shropshire, and comparative control trials of various soil and seed treatments on a commercial scale. It is not intended in this article to give full details of the results obtained in the course of these studies (they have already appeared in the *Annals of Applied Biology*, Vol. XXI, No. 2, May, 1934), but rather an abbreviated report of those results that are sufficiently practical to be of assistance to

* Ministry of Agriculture Monthly Reports on Incidence of Plant Pests for 1922-35.

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sugar-beet and mangold growers in their attempts to reduce the losses caused by this beetle.

Description and Life History.—The beetles are very insignificant in appearance, being less than one-tenth of an inch in length, very narrow, flattened, parallel-sided and of a reddish-brown colour. From early May until about the middle of July they may sometimes be found in enormous numbers feeding on the roots and leaves of sugar-beet and mangolds. The eggs are laid in the soil and give rise to larvæ or grubs that live for some weeks in the region of the root system of the plant. When fully grown, the larvæ turn into pupæ or chrysalides in the soil; such pupæ in due course become adult beetles that hibernate in the soil or among debris.

Nature of Injury and Plants Attacked.—The earliest sign of attack on sugar-beet or mangold crops is poor growth from seed, since the beetles feed on the shoot of the seed as it germinates. In severe infestation the crop is often completely destroyed in the germinating stage. Attacked seedlings are easily detected, in the first instance, by their poor growth, and, later, by the yellowing and wilting of the foliage. An examination of the underground parts of such seedlings will reveal that many or all of the finer roots have been destroyed and small excavations eaten out from the main root. In bad attacks, the seedlings often present a black constriction or threadlike appearance of the tap-root just below ground level.

The beetles attack not only the roots but also the aerial parts of the plant. At first, small irregular holes somewhat reminiscent of Flea Beetle attack are eaten in the leaves, but this form of damage is usually small and unimportant. Later, the crown or growing point of the plant is attacked and instead of normal leaves, a number of stunted, deformed ones are produced.

In addition to sugar-beet and mangolds, the beetle is occasionally responsible for damage to garden beet and in the absence of these cultivated plants may live on the weed commonly known as White Goosefoot or Fat Hen (*Chenopodium album*).

Influence of Cultural Operations on the Degree of Infestation.—The general field observations made in infested areas in Lincolnshire and Shropshire during the

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period, 1927-34, indicate that the cultural operations associated with sugar-beet and mangold crops have a marked influence on the susceptibility of the crops to serious injury by the Pigmy Mangold Beetle. It is believed that in the careful consideration of the various cultural factors as a whole lies the simplest solution, at the moment, of the problem of controlling this beetle under farm conditions. Of these factors, the most important are:—

1. *Rotation of Crops.*—A suitable rotation, in which susceptible crops are not taken too frequently on the same land, is an important factor affecting infestation, since serious outbreaks of the beetle occur only in areas in which sugar-beet or mangolds have been grown for several successive years. The exact time that should intervene between one crop of sugar-beet or mangolds and the next cannot be stated; but, judging from the various field observations made, it would appear that an interval of two years may often be sufficient, though several instances are known of satisfactory crops after a rest of one year only. In adopting this system of control, it must be remembered that during the interval between successive crops the beetles may live unnoticed upon White Goosefoot and even on the remnants of sugar-beet or mangolds. Further, susceptible crops should not be sown in close proximity to previously infested areas.

2. *Manurial Treatment.*—Intensity of attack by the Pigmy Mangold Beetle varies to a marked degree with the kind of manurial treatment adopted. It is found that manures that encourage a rapid growth of the plants in the seedling stage have a decidedly beneficial effect in reducing the extent of the damage. For this purpose, generous applications of nitrogenous fertilizers, in conjunction with farmyard manure or a complete dressing of artificials, are recommended. On some of the fen soils in Lincolnshire, however, heavy applications of potash often prove the most effectual of the manurial treatments for reducing the amount of beetle injury.

3. *Soil Consolidation.*—As with a large number of other soil pests, susceptibility of plants to attack by the Pigmy Mangold Beetle is closely correlated with the degree of consolidation of the soil. Plants grown in a firm seed-bed suffer much less than those growing where consolidation of the soil has been neglected. This reduction in the amount of damage to sugar-beet and mangold crops when grown on well-compressed soils is largely attributable to the quicker rate of growth of the young plants throughout the period of susceptibility to beetle injury. Further, it is possible that the reduced extent of damage under such conditions could also be explained, at least to some extent, by the inability of the beetles themselves to travel freely from plant to plant in a closely-packed soil. In view of the general observations made in infested areas, and the results of certain field trials on the relation between soil consolidation and the degree of attack by the beetle, it is suggested that, in addition to starting with a firm seed-bed, the land should be frequently rolled from the time the seed is sown until the plants are approximately 3 in. high. Thorough compression of the soil alone is not, however, considered sufficient to control the pest, except, perhaps, in areas that are but slightly infested.

4. *Extra Seeding.*—Although thick sowing of the seed of both mangolds and sugar-beet is one of the chief points in successful husbandry of these crops, it is found that many growers have yet to realize its supreme importance in areas subject to pest attack in the seedling stage. It is noteworthy that extra seeding as a precautionary measure against the Pigmy Mangold Beetle, was suggested

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by Miss Ormerod as far back as 1895; and that this method is practised at the present time with some measure of success on the Continent, where the Beetle is a serious pest to sugar-beet. Various field experiments carried out by the writer in Lincolnshire and Shropshire have shown, however, that increased amount of seed, although effective in cases of slight attack, has little or no influence in instances of heavier infestations.

5. *Time of Thinning.*—We already possess much evidence that justifies late thinning-out of the plants as a contributory factor in reducing the severity of attack. The extent of the reduction of attack produced by this method is usually somewhat small, but the practice is considered worthy of adoption, particularly where there is only slight infestation. It is realized that thinning cannot be postponed advantageously in all circumstances, but it should take place at the latest possible date, having regard to climatic and soil conditions.

Field Control Trials, 1928 and 1929.—Preliminary field experiments on the control of the Pigmy Mangold Beetle were carried out at the Kirton Agricultural Institute in 1928 and 1929, on a portion of a field where a crop of sugar-beet had been almost a complete failure in 1927 as the result of an attack by the beetle. Four soil treatments and three seed dressings were tested in these trials. The results obtained in both years were essentially similar in that only two of the seven treatments gave a significant control of the beetles as judged by the appearance of the plants in the seedling stage and by the increase in the yield of washed beet as compared with the control plots. The two treatments were:—

1. *Seed Dressing.*—For 20 min. before sowing the seed was steeped in a solution of 5 lb. magnesium sulphate and 1 lb. phenol in 10 gal. of water. The seed was then drained and sown with as little delay as possible.
2. *Soil Treatment.*—Calcium cyanamide was applied to the plots some fourteen days before sowing, at the rate of 6 cwt. to the acre, and then well harrowed into the soil.

In both years, the influence of the phenol-magnesium-sulphate treatment on germination of the seed was very marked. The seedlings on the plots sown with seed treated in this manner appeared above ground some 4 or 5 days in advance of those on the untreated plots. This advancement in germination was also accompanied by a more satisfactory number of seedlings and a much quicker rate of growth throughout the seedling period, compared with the control plots. The calcium cyanamide plots showed also a little improvement over the controls in these respects.

The beneficial effects produced by these two treatments were attended by less injury both to the shoots of the seeds

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as they germinated and to the root system of the seedlings, although the beetles were present in large numbers over the whole experimental area and irrespective of treatment.

The plots sown with seed immersed in phenol-magnesium-sulphate solution in 1929 gave an average weight of washed beet of approximately $15\frac{1}{2}$ tons per acre as compared with 12 tons from the controls—an increase of $3\frac{1}{2}$ tons to the acre due to the treatment. The gain in yield with calcium cyanamide was nearly 2 tons per acre over the control.

Field Control Trials, 1931.—With the object of obtaining more conclusive evidence of the value of the phenol-magnesium-sulphate treatment, a further experiment was conducted, in 1931, at Leighton, Shropshire, in a 5-acre field where an early-sown crop had been completely ruined by the Pigmy Mangold Beetle. The whole field was sown with treated seed except for two $\frac{1}{4}$ -acre plots that were sown with untreated seed and served as controls. As in the 1928-1929 trials, the treatment of the seed with phenol-magnesium-sulphate solution resulted in (a) earlier appearance of the seedlings through the ground, (b) a more rapid rate of growth during the period subject to root attack by the beetle, and (c) a significant increased yield of marketable roots per acre as compared with the controls. The calculated average yield per acre of washed roots on the treated area was 13 tons as compared with 7 tons 13 cwt. on the control plots. The increase in weight of washed beet, due to this treatment in the 1931 trial, was, therefore, at the rate of approximately $5\frac{1}{2}$ tons to the acre.

These field trials, taken by themselves, strongly suggest that economical crops of sugar-beet can be grown even on land heavily infested with the Pigmy Mangold Beetle if the seed is first treated with a solution of phenol and magnesium sulphate. It must be emphasized, however, that these experiments were carried out on small plots, and must therefore be regarded as preliminary; further extensive trials must be carried out over a succession of seasons, and under varied soil conditions, before final conclusions can be reached as to the true value of the treatment.

Practical Aspect of Treating Sugar-Beet Seed with Phenol-Magnesium-Sulphate Solution.—The seed is placed in a number of small thin bags and allowed to stand for 20 min. in a solution previously prepared by dissolving

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1 lb. phenol (carbolic acid crystals) and 5 lb. magnesium sulphate (Epsom salt) in 10 gal. of water. The bags containing the seed are raised and lowered a few times whilst in the solution so as to ensure that the fluid permeates the entire contents and surrounds every seed. After steeping, the bags are lifted out and the solution allowed to drain away. It is found in practice that the treated seed will drill without any difficulty, even after a very short period of draining, and that the seed should be sown with as little delay as possible after treatment in order to safeguard against heating or the possibility of loss of germinating power.

General Conclusions and Recommendations.—The only practical means of exterminating the Pigmy Mangold Beetle, once it becomes well established in areas devoted to sugar-beet and mangolds, is to alter the rotation and rest the ground from these crops for at least two years. In adopting this system of control, it is essential, during the interval between successive crops of sugar-beet or mangolds, to keep the infested land free from beetroot as well as the weed Fat Hen or White Goosefoot. Further, susceptible crops should not be sown in close proximity to areas that have suffered from attacks of the beetle in the previous season.

Where frequent cropping of the land with sugar-beet or mangolds cannot be avoided, the following recommendations—if carried out thoroughly—will materially help towards the production of a satisfactory crop:—

(a) *Encouragement of Rapid Growth.*—The first essential is good cultivation of the land, together with a generous application of a nitrogenous fertilizer in conjunction with dung or complete artificial manure, so that rapid growth and root development of the young plant may be encouraged. All the manurial ingredients should be applied some time before the seed is sown so that they may be readily available for the plants in their early stages of growth. Too liberal application of a nitrogenous fertilizer, however, must be avoided, since this would retard the maturing of the plants and the formation of high sugar-content.

(b) *Treatment of Seed.*—In the light of the results obtained in the field trials already described, the seed should be steeped for 20 min. in a solution of 5 lb. magnesium sulphate and 1 lb. phenol in 10 gal. of water. The seed should then be drained and sown as soon as possible.

(c) *Extra Seeding.*—The sowing of an extra quantity of seed is advantageous in order to compensate to some extent for the seedlings destroyed by the beetles.

(d) *Consolidation of the Soil.*—It is desirable to prepare a deep, firm seed-bed and to roll the land frequently from the time the seed is

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sown until the plants are approximately 3 in. high, as they suffer less damage by the beetle under such conditions.

(e) *Late Thinning*.—When an attack is in progress, thinning-out or singling should be carried out at the latest possible date, having due regard to soil and climatic conditions.

In conclusion, it must be emphasized that, although the magnesium-sulphate-phenol treatment described in this article may prove satisfactory in every way in preventing damage by the Pigmy Mangold Beetle, this fact should not be allowed to encourage repeated cropping of the same land with mangolds or sugar-beet, on account of the risk of building up an eelworm (*Heterodera schachtii*) infestation, leading ultimately to a condition known as "beet sickness."*

* See this JOURNAL for December, 1934, pp. 825-27.

MARKETING NOTES

Milk Marketing Scheme: Pool Prices for March, 1935.—The wholesale buying price for “liquid” milk in all regions during March was 1s. 4d. per gallon, a reduction of 1d. per gallon on the price for the previous month. Pool prices and rates of producer-retailers’ contributions for March are given below, with comparative figures for the preceding month and the month of March, 1934. In the latter month, the wholesale price was 1s. 2d. per gallon in all regions.

Region	Pool Price (d. per gal.)			Producer-Retailers’ Contributions (d. per gal.)		
	March 1935	Feb. 1935	March 1934	March 1935	Feb. 1935	March 1934
Northern ..	13	14	12½	2½ ¹¹ / ₁₆	2½	1½ ⁹ / ₈
North-Western ..	12½	14	12	2½	2½	1½
Eastern ..	13½	14½	12½	2½	2½ ⁷ / ₈	1½
East Midland ..	13	14½	12½	2½ ¹¹ / ₁₆	2½ ⁷ / ₈	1½ ⁹ / ₈
West Midland ..	12½	13½	11½	3½ ¹¹ / ₁₆	3	2½ ⁵ / ₈
North Wales ..	12½	13½	12	2½	3	1½
South Wales ..	13	14	12	2½ ¹¹ / ₁₆	2½	1½
Southern ..	13½	14½	12½	2½	2½	1½
Mid-Western ..	12½	13½	11½	3½ ¹¹ / ₁₆	3	2½
Far-Western ..	12½	13½	11½	3½ ¹¹ / ₁₆	2½ ³ / ₈	2½
South-Eastern ..	13½	14½	12½	2½ ⁵ / ₁₆	2½	1½
Unweighted Average	12.91	13.98	12.02	2.76	2.64	1.73

Producer-retailers who did not sell milk by wholesale during the month otherwise than on contracts carrying level delivery premiums were credited with a level delivery premium of ½d. per gallon. The Board’s levy for expenses, liabilities and reserves remained at ¼d. per gallon.

The following figures relating to sales indicate the substantial increase which has taken place in the quantity of milk sold on wholesale contracts:—

	March, 1935. (Estimated.)	March, 1934.
Contract Liquid Sales	48,010,973 gal.	45,033,216 gal.
„ Manufacturing Sales	24,202,669 „	15,733,876 „
Total Contract Sales	72,213,642 „	60,767,092 „
Percentage Liquid Sales	66.5	74.1
„ Manufacturing Sales	33.5	25.9

The average realization price of manufacturing milk during March, 1935, was 6.23d. per gal. compared with 6.27d.

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in February, 1935, and 4.77d. in March, 1934. Milk manufactured into cheese by farmhouse cheesemakers increased from 212,791 gal. in February to 286,899 gal. in March.

Price of Milk for Factory Cheese Manufacture.—The current milk contract provides that the formula for determining the price of milk sold to approved factories for the manufacture of cheese (other than soft curd cheese and cream cheese) shall be varied as from April 1, 1935, in such manner as the Milk Marketing Board thinks fit, if the Board, by resolution, so determine. Application for a reduction in the price at which milk shall be sold for cheese manufacture has been made to the Board by the National Association of Creamery Proprietors, representing the manufacturers, and the matter has by agreement been referred to arbitration. The hearing took place on April 11.

Fresh Cream Prices.—Since July 10, 1934, successive agreements have been made between representatives of the Irish Free State, Northern Ireland, the Scottish Milk Marketing Board, the English Milk Marketing Board and English cream manufacturers as to the prices at which fresh cream shall be sold by wholesale. At a recent conference, an agreement was concluded which took effect from April 1, 1935, and will run for six months unless altered in the meantime by a further conference. The agreed rates are 9s. per gal. for English cream, 8s. 9d. for Scottish cream, and 8s. 3d. for Northern Ireland and Irish Free State cream, all for quantities of 150 gallons or over delivered daily in one consignment. For smaller consignments, higher rates apply, the price for 1 gallon consignments being 12s. for all countries. No discounts are to be allowed, and no allowance is to be made to the purchaser for cream cans.

Roll of Accredited Producers.—Discussions between the Milk Board and representatives of county and municipal authorities have rendered possible the formulation by the Board of a scheme for establishing a roll of "Accredited Producers." The scheme takes effect on May 1, 1935. Any registered milk producer who presents to the Board a Grade A Certificate given under the Milk (Special Designations) Order, 1923, will be entitled to have his name placed on the roll. A bonus, in addition to the pool price, will be paid monthly at the rate of 1d. per gallon, to all

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accredited producers. The fund for payment of the bonus will be raised by a small levy on each gallon of milk sold by registered producers. Producers of Grade A (T.T.) and Certified milk who sell their milk through the Board will be entitled to have their names entered on the roll.

Report of the Consumers' Committee for England.—A further report upon the effect of the Milk Marketing Scheme upon consumers has been submitted to the Minister by the Consumers' Committee for England. Copies may be obtained free of charge on application to the Ministry. The report raises questions which, in the opinion of the Minister, are within the scope of the survey now being conducted by the Milk Reorganization Commission for Great Britain, whose terms of reference are to consider (*inter alia*) the working of organized milk marketing in Great Britain under milk marketing schemes, and its incidence on production, distribution and consumption. The Minister has accordingly requested the Reorganization Commission to give the report their very careful consideration in connexion with any proposals they may formulate for the improvement of organized milk marketing.

Milk Act, 1934.—Advances amounting to £864,933 have to date been made to the English Milk Marketing Board under Section 1 of this Act in respect of milk used for manufacture (excluding milk manufactured by the Board itself or milk used for cheese-making on farms). Details are given below:—

Period in which Milk was produced and manufactured	Gallons of Milk used	Products manufac- tured	Rate of ad- vance to raise price to 5d. (summer) and 6d. (winter)	Amount of Advance
1934 Apr.—Sept.	79,367,806	Butter, Cheese Milk Powder, Condensed Milk for Export, and Tinned Cream	*Varying from .25 to 1·5 pence.	£ 426,552 s. 9 d. 10
Oct., 1934— Feb., 1935	55,477,249		*Varying from 1·0 to 2·28 pence	438,380 19 10
Totals ...	134,845,055	—	—	864,933 9 8

* According to month and product.

Advances to the Board under Section 3 of the Act, in respect of milk manufactured into cheese on farms, now total £96,638 and are as follows:—

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Month in which Milk was produced and manufactured	Gallons of Milk used	Cheese Milk Price	Rate of advance to raise price to 5 <i>d.</i> (summer) and 6 <i>d.</i> (winter)	Amount of Advance		
1934		<i>d.</i>	<i>d.</i>	£	s.	<i>d.</i>
April ...	2,075,713	3'42	1'58	13,665	1	10
May... ..	3,147,624	3'40	1'60	20,984	3	3
June... ..	3,203,072	3'48	1'52	20,286	2	5
July... ..	2,674,487	3'75	1'25	13,929	12	4
August ...	2,375,049	3'83	1'17	11,578	7	4
September ...	1,833,953	3'86	1'14	8,711	5	6
October ...	581,776	3'72	2'28	5,526	17	5
November ...	207,239	4'04	1'96	1,692	9	0
December ...	36,169	4'25	1'75	263	14	8
Totals	16,135,082	—	—	96,637	13	9

Under Section 6 of the Act, a sum of £152,077 has, by direction of the Treasury, been paid to date to the Government of Northern Ireland with the object of securing a standard price for milk manufactured into cream and butter at registered premises in Northern Ireland. This sum is made up as follows:—

Period of Manufacture	Gallons of Milk used for Cream and Butter	Equalization payment per gallon to raise price to 5 <i>d.</i> (summer) and 6 <i>d.</i> (winter)	Amount of Equalization payment		
1934			£	s.	<i>d.</i>
Apr.—Sept. ...	12,138,035	*Varying from 1'3 to 2'2 pence	101,246	12	7
Oct. 1934— Jan. 1935	4,620,725	*Varying from 2'05 to 3'0 pence	50,830	12	9
Totals	16,758,760	—	152,077	5	4

* According to month.

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4·18 pence per pound for the month of April.

Milk for Schools.—Payments amounting to £174,184 have been made to date to the Milk Marketing Board under Section II of the Milk Act by way of compensation in

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respect of the Board's expenses in supplying milk to school-children at reduced rates. Details are given below :—

Month	Gallons Consumed	Wholesale price per gallon		*Loss to Board per gal.	Rate of Compensation per gal.	Amount of Exchequer Payment		
		s.	d.	d.	d.	£	s.	d.
1934								
October ...	1,958,055	1	4	10	5	40,792	16	2
November ...	2,419,319	1	4	10	5	50,402	9	6
December ...	1,610,862	1	5	11	5½	36,915	12	1
1935								
January ...	2,010,466	1	5	11	5½	46,073	3	6
Totals	7,998,702	—		—	—	174,184	1	3

* Wholesale price, plus 6d. distribution costs, minus 1s. paid by children.

Pigs and Bacon Marketing Schemes: Pig Prices for April.—The basic price, calculated in accordance with the provisions of the contract, for pigs delivered in April was 11s. per score, compared with 11s. 11d. per score in March. This price is exclusive of the curers' contribution of 1d. per score towards insurance, and of any bonus payment to which the producer may become entitled under the arrangement noted below.

Bonus Scheme.—In addition to the basic price, the curer pays to the Pigs Marketing Board 2d. per score in respect of every pig delivered to and accepted by him during 1935 for manufacture into bacon, except pigs delivered under the special form of contract prescribed for Disease-infected Areas. By agreement between the two Boards, the fund thus created will be used for bonus payments to registered pig producers who deliver in the four months, January to April, 1935, at least 25 per cent. of the total number of pigs which they have contracted to deliver over the whole year. Producers participate in the bonus scheme as follows: those producers who deliver by April 30 more than 33½ per cent. of their contract total for the year will receive three times the rate of bonus allotted to producers delivering from 25 to 30 per cent. in that period. Producers delivering from 30 to 33½ per cent. will receive twice the lowest rate of bonus.

Complaints Against the Operation of the Schemes.—The Committee of Investigation for Great Britain appointed by

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the Minister of Agriculture and Fisheries and the Secretary of State for Scotland under Section 9 of the Agricultural Marketing Act, 1931, have reported on complaints made to them by the Parliamentary Committee of the Co-operative Congress, and the National Federation of Meat Traders' Associations against the operation of the Pigs and Bacon Marketing Schemes. The Parliamentary Committee and the National Federation complained that they were suffering loss by reason of the requirement of the Pigs Marketing Board that all registered curers having contracts registered with the Board should sign an agreement with the Railway Companies for the transport at a flat rate of all live pigs purchased by them.

After considering the evidence and arguments submitted, the Committee found that:—

1. A flat rate transport system is necessary for the efficient operation of the Pigs and Bacon Marketing Schemes.

2. As a result of the flat-rate system, some curers are undoubtedly paying more for transport than previously, and to that extent the action of the Pigs Marketing Board is contrary to the interests of those persons.

3. The Pigs Marketing Board were, however, acting in the best interests of the pig industry and may, therefore, in the absence of counter-balancing considerations, be said to have acted in the public interest.

The Minister and the Secretary of State do not propose, therefore, to take any action under Section 9 (5) of the Agricultural Marketing Act, 1931.

The Committee consists of the Right Hon. Edward Shortt, K.C., Sir Percy Greenaway, Mr. C. J. G. Palmour, Mr. Arthur Pugh and Professor W. R. Scott.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Act, 1934, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by April 11, 1935, to £2,129,832. These payments were in respect of 888,848 animals, the average payment per beast being £2 8s. 0d.

Amended and Additional Arrangements.—Certain minor amendments and additions to the Cattle Subsidy Arrangements recommended by the Cattle Committee were approved by the appropriate Ministers on March 28 to take effect as from April 1. They relate (i) to the requirement that no member of a Certifying Authority shall determine the eligibility of any animal in which he is directly or indirectly interested, (ii) to the fees and charges payable by

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producers in respect of animals certified, and (iii) to the provision of means of identification by temporary paint marks of eligible and ineligible animals following examination at certification centres.

The fee which may be paid to the producer and butcher representatives on Certifying Authorities is raised from *1d.* to *2d.* per animal certified. The charge which the Certifying Officer may make on a producer in addition to the foregoing charges is reduced from *1s. 3d.* to *1s.* in respect of each animal certified.

Wheat Act, 1932: *Sales of Home-Grown Wheat.*—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1934, to April 5, 1935, cover sales of 28,718,212 cwt. of millable wheat. In the last cereal year the total sales up to April 6, 1934, amounted to 23,401,442 cwt.

Wheat By-laws.—By-law No. 20 of the Wheat By-laws, 1932, which dealt with the question of arbitration in disputes as to whether a substance was flour or bread, has been revoked by a new by-law recently made by the Wheat Commission. The new by-law has been approved by the Wheat Commission (Approval of By-laws) No. 8 Order, which was made on March 27, 1935.

Deficiency Payments—1934-5 Cereal Year.—The Wheat Commission announced that a third advance payment will be made at the end of April in respect of all proper applications received from registered growers on valid wheat certificates delivered to the Wheat Commission after January 25, 1935, and on or before April 5, 1935. Payment will be made at the same rate as previous advances, viz., *3s.* per cwt. or *13s. 6d.* per quarter of 504 lb.

The Commission hope to make one further advance payment at a date to be announced later.

Sugar-Beet: *Production of Home-Grown Beet Sugar, 1934-35 Campaign.*—The total quantity of sugar manufactured from home-grown beet during the campaign was 12,294,876 cwt., as compared with 9,260,877 cwt. in the 1933-34 campaign, an increase of approximately 33 per cent.

The Beet Sugar Industry: Report of Committee of Inquiry.—The Report of the United Kingdom Sugar Industry Inquiry Committee, under the Chairmanship of

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Mr. Wilfrid Greene, K.C., was published on April 10, 1935.* The Committee was appointed by the Chancellor of the Exchequer and the Minister of Agriculture and Fisheries in April, 1934, to inquire into the conditions of the United Kingdom sugar industry as a whole, and, in particular, to make recommendations as to the application of State aid in so far as this may be considered necessary.

The Committee's Report is not unanimous. The Majority Report, signed by Mr. Wilfrid Greene and Sir Kenneth Lee, concludes that the advantages resulting from a beet sugar industry are insufficient to justify a recommendation to continue assistance to that industry. In a Minority Report, Mr. Cyril Lloyd takes the opposite view.

The first two chapters of the Majority Report review the production and consumption of and the trade in sugar in the United Kingdom and throughout the world. The State assistance accorded almost universally to both cane and beet sugar production is described, and it is explained that the surpluses that at present form so large a part of the world market supplies are "dumped" sugar. It is the sale of this dumped sugar on the reduced world market that determines the world price and accounts for the low values now ruling.

Chapter III sketches the events leading up to the British Sugar (Subsidy) Act, 1925, and Chapter IV describes in more detail the development of the British beet sugar industry from two factories in 1924 producing 24,000 tons of sugar from 23,000 acres, to eighteen factories in 1934 producing 615,000 tons from 404,000 acres. The reduction in the rate of assistance over the past decade, the decrease in agricultural and factory costs, and the financial results of the industry are examined. The effect of the sugar-beet crop on farming practice is described and an attempt is made to calculate the amount of additional direct employment provided by the industry.

Chapter V deals with the sugar refining industry, its protection from foreign competition and its relations with the beet sugar factories, and concludes that the fiscal changes made in the Finance Act, 1928, placed the refineries in an unduly favourable position *vis-à-vis* the beet sugar factories. The sixth chapter, which describes

* Report of the United Kingdom Sugar Industry Inquiry Committee, Command 4871. Published by His Majesty's Stationery Office, Adastral House, Kingsway, W.C.2, price 2s., post free 2s. 2d.

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the consumption and distribution of sugar in the United Kingdom, refers to the considerable fall in the sugar price and the comparatively small margin of profit in distribution.

Chapter VII outlines the case for the continuance of assistance to the British beet sugar industry, enumerating the agricultural and general advantages and distinguishing between the relief of unemployment and the relief of agriculture. The eighth and ninth chapters are concerned respectively with the scope for economies and for reorganization. Economies can continue to be made, both in the beet price and in manufacturing costs. There is no great scope for reorganization on the agricultural side, although the Sugar-Beet Marketing Scheme has useful features. There is more opportunity for reorganization in the manufacture of beet sugar.

In Chapter X, a detailed plan of industrial reorganization is set out, in case a decision is taken to continue State support. This plan provides for control of the sugar industry by a Permanent Sugar Commission and for the amalgamation of the beet sugar interests. It includes the limitation of the beet sugar industry to its present size, the restriction of factory profits, and the provision of assistance in the form of an Exchequer subsidy.

Finally, the Majority Report sets out in Chapter XI the reasons that have led the signatories to the conclusion that they are unable to recommend the continuance of State support to the beet sugar industry beyond the maximum rate of duty preference granted to Colonial sugar. They recognize that in existing circumstances this will substantially mean the disappearance of the beet sugar industry, and, in that event, they propose that existing sugar-beet growers should be compensated by cash payments on a descending scale for three years at the rate of £3, £2 and £1 per acre respectively for the average acreage grown in 1933-35. At the same time, the protection now given to the refining industry should be reconsidered.

Mr. Cyril Lloyd, in his Minority Report, concurs generally with the account of the circumstances of the United Kingdom sugar industry as a whole as set out in Chapters I to IX, but not with the inferences of his colleagues. His Report is divided into five parts. In the first, he sets out the reasons for differing from the opinions expressed in Chapter XI in the Majority Report with regard to the continuance of assistance. The second part

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gives the reasons why the future level of assistance, which is material to the consideration of a long-term policy, is likely to be very substantially below the present level. In part three, the benefits arising from the maintenance of the beet sugar industry are described and the reasons given for considering that they are sufficient to justify the reduced cost of supporting the industry in future.

Mr. Lloyd agrees that the future conduct of the industry should be on the lines set out in the Majority Report, but, in the fourth part of his Report, he proposes certain modifications, including the purchase of sugar-beet at an on-farm instead of a delivered price, and the provision of assistance, in the first place, by the remission of the Excise duty. Part five contains a summary of recommendations.

National Mark Scheme for Cheshire Cheese.—2,986 farm-made Cheshire cheese were graded in the quarter ended March 31, 1935, of which 337 were "Extra Selected" and 2,649 "Selected." In addition to the above, 6,400 factory manufactured Cheshire cheese were graded and marked with the National Mark. As from March 11, and with the concurrence of the manufacturers, the grading of factory-made Cheshire cheese was undertaken by the official grader of the Cheshire Cheese Federation.

Proposed National Mark Schemes for Cheddar and Caerphilly Cheese.—A meeting of the Cheese Marking Sub-Committee, which was set up by the National Mark Cheese Trade Committee to investigate the problem of applying satisfactorily grader's marks and the National Mark to Cheddar and Caerphilly cheese, was held on March 11, 1935. As a result of a number of experiments carried out at the National Institute for Research in Dairying at Shinfield and at the Ministry, a satisfactory method of marking has been devised. The Committee of the National Association of Creamery Proprietors and Wholesale Dairymen have approved, in principle, the application of the National Mark to Cheddar cheese.

Proposed National Mark Scheme for Cream Cheese.—Draft statutory grades and a National Mark Scheme for cream cheese were discussed at a meeting, on March 29, between representatives of cream cheese manufacturers, the British Dairy Institute (Reading University) and officers of the Ministry. The provisional draft scheme provides for

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two grades, viz.: "Extra Selected (double cream)" and "Selected (single cream)."

The main provisions of the scheme received the general approval of the manufacturers present. Certain amendments to the draft grade specifications were suggested, and arrangements were made for a number of samples of cream cheese from different sources, and made from milk contained various percentages of butter fat, to be analysed by the Government Chemist in connexion with the specification of butter fat and water content requirements.

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during January, February and March, 1934 and 1935, and the three weeks ended April 20, 1935, were as follows:—

LONDON AREA.

			<i>Home-Killed.</i>	<i>Scotch Sides for London.</i>	<i>Total.</i>
January, 1934	..	..	9,964	6,632	16,596
" 1935	..	..	10,987	7,580	18,567
February, 1934	..	..	7,514	6,057	13,571
" 1935	..	..	9,520	7,124	16,644
March, 1934	..	..	8,075	6,668	14,743
" 1935	..	..	10,503	8,347	18,850
Three weeks ended April 20, 1935			7,660	5,643	13,303

BIRKENHEAD AREA.

(Including Liverpool.)

			<i>For London (included under Home-killed in London Area).</i>	<i>Liverpool (for local requirements).</i>	<i>Total.</i>
January, 1934	..	..	3,324	1,115	4,439
" 1935	..	..	2,431	1,659	4,090
February, 1934	..	..	2,001	1,233	3,234
" 1935	..	..	2,037	1,486	3,523
March, 1934	..	..	1,933	1,303	3,236
" 1935	..	..	2,384	1,855	3,739
Three weeks ended April 20, 1935	..	..	1,093	1,038	2,131

BIRMINGHAM AND YORKSHIRE AREAS.

		<i>Birmingham.</i>	<i>Leeds.</i>	<i>Bradford.</i>	<i>Halifax.</i>
January, 1934	..	5,532	2,315	1,836	481
" 1935	..	5,386	2,493	1,764	489
February, 1934	..	4,904	1,980	1,608	377
" 1935	..	4,845	2,180	1,624	427
March, 1934	..	4,909	2,190	1,608	465
" 1935	..	5,143	2,459	1,575	460
Three weeks ended April 20, 1935	..	3,500	1,759	1,214	338
					165

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Fat Stock: Carcass Sales by Grade and Dead Weight.—The insurance provisions in regard to fat stock consigned to the Ministry's centres, for sale on the basis of dead-weight and grade, have recently been extended to cover the producer's risk of losing Cattle Fund Payment in respect of the whole or parts of beef carcasses of gradable quality which are condemned by Public Health Authorities on account of disease. The insurance covers the entire risk of condemnation for disease as well as the risks of injury, death or damage by accident to the animals in transit. In cases of condemnation, the producer is now assured of the full quoted price from the wholesaler, plus a separate payment from the National Farmers' Union Mutual Insurance Society in lieu of Cattle Fund payment. The Insurance Company has undertaken the new risk without extra cost, and the premiums, which are shared equally by wholesalers and producers, remain as follows:—

<i>Class of Animal.</i>						<i>Premium.</i>	
						<i>s.</i>	<i>d.</i>
Bullocks and Heifers	..	..	..	..	..	2	0
Cows	..	..	..	..	..	4	0
Calves	..	..	..	..	..	0	2
Sheep and Lambs	..	..	..	..	..	0	1
Porkers up to 120 lb. dead-weight						0	4
„ exceeding „	..	..	..	..	..	0	6
Sows	..	..	..	..	..	1	0

Producers, in increasing numbers, are taking advantage of the facilities provided by the Ministry's Scheme. Details of the consignments dealt with in the three months ended March 31, 1935, are shown below, together with corresponding details for the same period of 1934:—

<i>Cattle.</i>				<i>Sheep.</i>		<i>Pigs.</i>	
<i>Conspts.</i>	<i>No.</i>			<i>Conspts.</i>	<i>No.</i>	<i>Conspts.</i>	<i>No.</i>
3 months to 31.3.1935	556	2,917		50	1,889	44	727
„ „ „ 31.3.1934	180	1,188		68	2,756	39	484

The increased numbers of stock coming forward reflect the continued confidence of producers and wholesalers who have given the scheme a trial. The decline in the figures for fat sheep is, of course, attributable to the relative scarcity of this class of stock.

Of the 2,822 bullocks and heifers received under the Dead-Weight Scheme during the past quarter, 2,691 were certified for Cattle Fund payments based on dead-weight certification.

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The animals sold under the scheme since its inception have realized £311,080 7s. od.; they comprise 14,478 cattle, 39,965 sheep and lambs, and 2,242 pigs.

National Mark Fruit and Vegetable Schemes.—The Ministry's Marketing Leaflets Nos. 58 and 59, on the subject of the National Mark schemes for vegetables and fruit respectively, have recently been published. These schemes have now been extended to cover all fresh vegetables and fruit in commercial production. Full details of the schemes, with illustrations, are to be found in the leaflets, copies of which may be obtained on application to the Ministry.

National Mark Honey.—At a recent meeting of the Trade Committee, consideration was given to comments and criticisms invited from Associations of Beekeepers, distributors and others, on the Committee's draft voluntary marketing scheme for National Mark Honey, drawn up in 1934. It was agreed that useful work had been done in helping to focus the attention of the industry on the problem of marketing, and the Trade Committee felt that if there were a general desire among beekeepers to set up an organization for the sale of their honey, the time was now ripe for them to co-operate and devise a workable scheme. To assist the industry in reaching its own decision, the comments received on the voluntary scheme have, at the recommendation of the Committee, been communicated to all beekeepers' associations and individual National Mark packers.

A standard single-walled hive, known as the "National" hive, and made to specifications agreed upon after examination of a number of already existing patterns, by a panel of experts appointed by the Trade Committee, is now on the market. A new leaflet (Marketing Leaflet No. 79), giving working drawings and instructions for the assembly of the hive, has been issued by the Ministry and can be obtained on application.

National Mark Creamery Butter.—Of the quantity of butter consumed in England and Wales, not more than 10 to 15 per cent. is home-produced. There is an appreciable demand for home-produced butter, but obviously it depends upon a regular output of supplies of a high and

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uniform quality. As this objective could be attained by a large-scale creamery production, under a system whereby a guarantee of the quality of the butter produced could be given, the Ministry, after consultation with representative producers' organizations, butter packers and members of the trade, introduced early this year a National Mark Scheme for creamery butter.

The following is a general outline of the scheme:—

A statutory definition of quality for Creamery Butter is prescribed in the Agricultural Produce (Grading and Marking) (Creamery Butter) Regulations, 1935, and specifies certain requirements as to flavour, body and texture, colour, appearance and finish, and absence of moisture. Only one statutory grade is prescribed, viz., "Selected Creamery."

The National Mark may be applied only to creamery butter derived from cow's milk produced in England and Wales. Pre-packed butter may be shaped as bricks, rolls or curls, weighing 1 lb., $\frac{1}{2}$ lb. or $\frac{1}{4}$ lb., and must be wrapped in vegetable parchment of standard weight (18 lb. minimum per ream). Bulk butter may be packed in 112 lb. kegs or tubs, 56 lb. or 28 lb. boxes or tubs, or 14 lb. boxes. These kegs, boxes or tubs must be lined with vegetable parchment of standard weight (25 lb. minimum per ream).

The official National Mark label for pre-packed butter must be applied to the butter either in such manner that it can be seen through the wrapper, or in a prominent position on the wrapper. The label for bulk butter must be affixed to the container in a prominent position, while the label applied to the butter in the container must be of such a texture that it cannot be re-used.

The minimum annual output qualification for enrolment in the scheme is 30 tons. Before an applicant can be authorized, the Ministry must be satisfied that his premises and equipment are clean, hygienic and suitable for butter making, and include refrigerating plant and adequate cold storage accommodation. Furthermore, a sample of butter taken at random at an applicant's premises must, on detailed examination, score 93 points out of 100, including not less than 47 out of 50 for flavour. In addition, a "keeping quality" test is prescribed; for this purpose, a portion of the foregoing sample must be retained at a temperature of

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60° F. for a week and thereafter re-examined, more especially for flavour.

An authorized packer, before applying the National Mark, must examine and score, on the day of despatch, a sample from each churning of butter in a consignment; and if this sample scores less than 93 points (including not less than 47 for flavour) the National Mark may not be applied to any portion of that churning.

Except where otherwise approved by the Ministry, imported and blended butter must be stored in a separate part of an authorized packer's premises from that used for storing butter intended to be packed under the National Mark.

Considerable interest has been shown in this scheme and many inquiries from makers are being received. So far, seven makers have enrolled, and when the extensions and alterations, which are taking place at a number of creameries, have been carried out, this number will be appreciably increased. The following is a list of authorized packers as at the end of March, 1935:—

Berkshire Vale Farmers, Ltd., Didcot.
Farma Cream Product Co., Ltd., Bourton.
R. S. Norrish & Sons, Ltd., Sampford-Peverell, Tiverton.
Primrose Dairy Co., Sancread, New Bridge.
South Western Dairies, Ltd., Sherborne.
C. & E. Walker, Ltd., Wellington.
West Cornwall Creameries, Ltd., Lelant.

Marketing Leaflet No. 78, fully describing the Creamery Butter Scheme, is obtainable, free of charge, on application to the Ministry.

Marketing Demonstrations at Agricultural Shows.—The Ministry is arranging to exhibit at the following agricultural shows during the summer period:—

Bath and West:—Taunton—May 29-June 1.
Royal Counties:—Weymouth—June 5-8.
Suffolk County:—Halesworth—June 6-7.
Three Counties:—Gloucester—June 11-13.
Royal Cornwall:—Newquay—June 12-13.
Lincolnshire:—Grantham—June 19-21.
Peterborough:—Peterborough—June 25-27.
Royal:—Newcastle—July 2-6.
Aldershot:—Aldershot—July 3-6.
Great Yorkshire:—Sheffield—July 10-12.
Kent County:—Ashford—July 11-13.
Royal Welsh:—Haverfordwest—July 24-26.
Royal Lancashire:—Burnley—August 1-5.

Publicity for Home-Grown Flowers and Plants.—Representatives of the London Press were invited to a

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private view of Covent Garden Flower Market on Tuesday morning, April 9. The visit was arranged by the Flowers and Plants Publicity Committee of the Ministry, in co-operation with the British Flower Marketing Association, with the object of giving the Press an opportunity of seeing for themselves some of the results of recent developments in the home-production of cut flowers. Invitations were accepted by all the principal London newspapers and periodicals. The party met at Messrs. George Monro's offices at 6.30 a.m., and inspected the firm's warehouses, where a fine display of flowers was assembled, before proceeding to make a complete tour of the Flower Market under the guidance of the President and members of the British Flower Marketing Association.

Press visits to the Flower Markets in Liverpool, Edinburgh, Glasgow, Birmingham, Leeds, Leicester and Nottingham were arranged simultaneously with the visit to Covent Garden.

A half-day tour by rail and road to the Lincolnshire bulb fields, to enable the public to see the tulips in flower, has again been organized by the Flower and Plants Publicity Committee in co-operation with the London and North Eastern Railway Company and the Spalding and District Bulb Growers' Association. The tour will take place on Thursday, May 16, and will be run on similar lines to the successful excursion last year. The tourists will proceed by one of the North Eastern Railway's special tourist trains from King's Cross to Spalding, whence they will make a circular tour of the bulb fields by motor coach, with a halt for tea at Holbeach. The party will be accompanied by expert guides, and stops will be made to view the flowers at close quarters. The special train will leave King's Cross at 12.30 p.m. The cost of the return fare will be about 8s. *od.*

On the day preceding the excursion from London, a similar excursion will be run from towns in the West Riding of Yorkshire.

Arrangements have been made for a paper on the British bulb industry to be included in the programme of the annual conference of the Institute of Park Superintendents, which will be held at Swansea in July. The paper will be read by Mr. G. W. Leak, V.M.H.

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Irish Free State Pigs and Bacon Bill, 1934.—The Irish Free State Pigs and Bacon Bill, which has received a Second Reading in the Dail, follows substantially the recommendations of the Pig Industries Tribunal whose report was summarized in this JOURNAL for March, 1934 (pp. 11, 77-8).

The main provisions of the Bill apply only to licensed curers. In addition, provision is made for registration of "minor curers"—curers who, during 1934, manufactured less than 2,200 cwt. of bacon—and of pork butchers who wish to manufacture bacon. The registration of minor curers will be for two years, after which it will be unlawful for them to cure any bacon for sale unless they become licensed. Registered pork butchers must not manufacture into bacon in any year more than 15 per cent. by weight of all carcasses handled at their premises and not more than 400 cwt. of bacon in all. Both registered minor curers and registered pork butchers are required to make returns to the Minister of Agriculture of all bacon produced by them, as well as, in the case of pork butchers, the quantity of fresh pork sold. Minor curers are also required to pay to the Minister a fee of 2s. per carcass used for bacon and registered pork butchers are required to pay 2s. per cwt. of pork so used.

Canada: Vegetable Marketing Schemes.—The two following schemes, to regulate the marketing of vegetables grown in described areas in the province of British Columbia, have been approved by the Dominion Marketing Board and became effective as from March 4, 1935:—

British Columbia Coast Vegetable Marketing Scheme. (February 28, 1935.)

British Columbia (Interior) Vegetable Marketing Scheme. (March 2, 1935.)

The "Coast" scheme regulates the marketing of vegetables of all kinds produced within the area, other than rhubarb, hot-house tomatoes and cucumbers, and excepting beans, corn and peas grown or sold for canning. The new scheme is to regulate inter-provincial and export trade, and is complementary to the scheme, under provincial legislation, which regulates the trade within the province. It is to be administered by the existing provincial Vegetable Marketing Board.

MARKETING NOTES

The "Interior" scheme regulates the marketing of all vegetables (including tomatoes, cucumbers, corn, peas, beans and potatoes) produced within the area by any producer whose total area of the regulated product is one-quarter of an acre or more. The scheme is designed to organize the marketing of vegetables through a "marketing agency," which is to be designated by the local board; the trade to be regulated is principally inter-provincial. A provisional board of five members is named to administer the scheme in its early stages, but the permanent board will consist of three members. Two members are to be registered producers, elected annually by district delegates appointed by producers; and the third member, nominated by a representative body of distributors, is to be appointed annually by the two producer members.

Each scheme provides for the registration and licensing of producers and distributors, and confers upon the local board wide powers for the control of marketing. Regulations may be issued by the board as to the marking or labelling of packages to indicate class, variety, grade and size, and that all charges or tolls have been paid and that the producer and distributor are duly registered or licensed. Pools may be conducted for the equalization of returns from any regulated product, and compensation may be paid out of the pool to any person for loss sustained pursuant to an order of the board as to the time and place of marketing.

Marketing levies may be imposed, and grants or loans may be made, to promote facilities for storage, preservation and processing, and to assist market research work.

The powers provided in the "Interior" scheme may be applied to potatoes only with the approval of the Dominion Board, whilst under the "Coast" scheme the local board may not control vegetables other than potatoes until April 1, 1935. The Dominion Root Vegetables Act, which provides for the standardization of root vegetables, and of packs thereof, entering inter-provincial and export trade, is to remain effective and paramount.

BEET SUGAR INDUSTRY IN GREAT BRITAIN

FINANCIAL POSITION OF THE FACTORY COMPANIES

THIS article reviews the financial position of the beet sugar factory companies as at March 31, 1934, and the trading results of the 1933-4 manufacturing campaign. It supplements the information given on the subject in the "Report on the Sugar-Beet Industry At Home and Abroad"* and continued in the February, 1932, March, 1933, and February, 1934, issues of the JOURNAL relative to the 1930-1, 1931-2 and 1932-3 campaigns respectively. There are 15 companies operating 18 factories; and the factory which was closed for the 1932-3 beet sugar campaign re-opened for the campaign under review.

Table I (see Table 67 and Appendix H of the Sugar-Beet Report) gives a summary of the combined balance sheets of all the companies, and shows their financial position as at March 31, 1934. Figures for the previous year are shown for comparison. Reserves and credit balances on Profit and Loss Account amount to £1,993,894, of which £370,392 was appropriated for payment of dividends, equal to 8.3 per cent. on the total share capital, leaving £1,623,502 to be carried forward. Dividend payments in the previous year amounted to £237,993 or 5.4 per cent., and in 1931-2 to £194,125 or 4.4 per cent.

The position in regard to expenditure on factories and equipment to March 31, 1934, is as follows:—

	£	£
Total expenditure		8,939,443
Less: Depreciation	3,590,790	
Written off on reconstruction	153,288	3,744,078
Balance as per Table I		<u>£5,195,365</u>

Investments amounted to £854,501, of which £769,325 was invested in associated companies, as compared with £815,287 and £733,829 in 1932-3 and £820,462 and £733,534 in 1931-2. The capital cost per ton of beet

* Economic Series No. 27: H.M. Stationery Office, 1931. (Price 6d. net, post free 1s.)

THE BEET SUGAR INDUSTRY IN GREAT BRITAIN

worked in the 1933-4 campaign was £2.7 as against £3.9 in the previous year and £5.3 in 1931-2.

The quantity of beet worked in the campaign under review was 3,298,119 tons and the duration of the campaign 107 days, compared with 2,232,061 tons and 80 days in 1932-3 and 1,667,288 tons and 64 days in 1931-2. The average daily throughput of beet was 30,824 tons in 1933-4, 27,901 tons in 1932-3, and 26,501 tons in 1931-2; and the corresponding daily rated capacities, 29,950 tons, 25,350 tons (excluding the factory which did not operate with a capacity of 1,000 tons per day), and 25,450 tons, respectively. The production of sugar, expressed in terms of commercial white sugar, was 455,337 tons, as against 324,563 tons in the previous year and 246,432 tons in 1931-2.

Table II (see Table 70 and Appendix F of the Sugar-Beet Report) has been compiled from data supplied by the factories, and shows, as compared with the previous year, the manufacturing costs and charges under the various main sub-heads of expenditure in total and per ton of beet worked. The total cost per ton of beet was 1s. 0d. less than in 1932-3 and 3s. 7d. less than in 1931-2.

Table III (see Table 91 and Appendices F and G of the Sugar-Beet Report) summarises the trading and profit and loss accounts for the financial year ended March 31, 1934 (1933-4 campaign) together with figures for the previous year (1932-3 campaign) as a comparison. The total income from products, after deducting Excise Duty but before crediting subsidy, was £6,152,264, or 37s. 3d. per ton of beet, as against £4,482,495, or 40s. 2d., in 1932-3; and £3,293,820, or 39s. 6d., in 1931-2. The net profit on subsidiary industries amounted to £82,644, comparing with a loss of £28,061 in the previous year, and a profit of £67,011 in 1931-2. The net profit per ton of beet, before charging interest, depreciation, income tax, etc., was 7s. 5d. in 1933-4, or an increase of 1s. 9d. per ton over 1932-3, and 3s. 6d. per ton over 1931-2.

The total appropriations of profit amounted to £1,149,595, leaving a balance of £74,500 to be carried forward. In relation to the total capital employed (£6,913,406), the amounts distributed in dividends and interest, less interest received from investments, was £469,353 or 6.8 per cent., the amount applied to writing

THE BEET SUGAR INDUSTRY IN GREAT BRITAIN

down fixed assets, 4·7 per cent., and the amount placed to reserve, 2·4 per cent.

TABLE I.—SUMMARY OF BALANCE SHEETS OF BRITISH BEET SUGAR FACTORY COMPANIES AS AT MARCH 31, 1933* AND 1934.

	As at March 31		Increase or Decrease
	1933*	1934	
<i>Liabilities</i>	£	£	£
Share Capital	4,445,954	4,445,954	—
Mortgages and Debentures...	1,479,536	1,384,522	— 95,014
Bank and other Loans ...	821,901	1,082,930	+ 261,029
Sundry Creditors and out- standings	736,859	1,050,701	+ 313,842
Reserves†	1,392,555	1,455,912	+ 63,357
Profit and Loss Balances before appropriation of Dividends, <i>less</i> deficits ...	331,083	537,982	+ 206,899
Total Liabilities... ..	£9,207,888	9,958,001	+ 750,113
<i>Assets</i>			
Beet Sugar Factories & Equip- ment <i>less</i> Depreciation ...	5,372,308	5,195,365	— 176,943
Investments	815,287	854,501	+ 39,214
Stocks and Stores	1,896,353	2,362,024	+ 465,671
Sundry Debtors and Prepay- ments	538,055	980,107	+ 442,052
Cash Balances	585,885	566,004	— 19,881
Total Assets	£9,207,888	9,958,001	+ 750,113

* Including the balance sheet of the factory that did not operate in the 1932-3 beet sugar manufacturing campaign.

† Including capital reserves; also special reserves amounting to £183,297 in 1933 and £92,247 in 1934, of which the £183,297 in 1933 and £83,247 in 1934 represent advances under the British Sugar Industry (Assistance) Act, 1931, which were contingently recoverable. (Although the liability to repay advances under the provisions of the Act did not expire until September 30, 1934, a number of factories brought them into credit of profit and loss account at March 31, 1934, by which date the manufacture of sugar and, therefore, the contingency of the liability, had ceased.)

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TABLE II.—MANUFACTURING COSTS AND OVERHEAD CHARGES OF BRITISH BEET SUGAR FACTORIES FOR THE CAMPAIGN YEARS 1932-1933 AND 1933-1934. TOTAL AND PER TON OF BEET WORKED.

	1932-3		1933-4		Increase or decrease per ton of beet
	Total	Per ton of beet	Total	Per ton of beet	
	£	s. d.	£	s. d.	s. d.
Coal and Coke	296,721	2 8	420,033	2 6	— 0 2
Limestone ...	58,910	0 6	84,920	0 6	—
Bags ...	119,062	1 1	187,833	1 2	+ 0 1
Other Manufacturing supplies	73,951	0 8	110,589	0 8	—
Repairs and Maintenance...	101,240	0 11	140,747	0 10	— 0 1
Salaries and Wages ..	534,310	4 9	689,012	4 2	— 0 7
Rates and Insurance ...	44,308	0 5	49,252	0 4	— 0 1
Other general charges ...	73,273	0 8	86,857	0 6	— 0 2
Beet expenses...	143,165	1 3	201,150	1 3	—
Total ...	1,444,940	12 11	1,970,393	11 11	1 0

REFERENCES TO TABLE III (OPPOSITE).

* The figures are based on the confidential trading and profit and loss accounts of all the companies.

† Including, where applicable, figures of the factory which did not operate in the 1932-3 beet sugar manufacturing campaign.

‡ Includes £100,050 advances under the British Sugar Industry (Assistance) Act, 1931, brought into account. (See Note †, Table I.).

§ Unappropriated balances, 1933-4, representing:—

	£	£
Increases in credit balances ..	52,610	
Less Decreases „ „ „ ..	20,295	
		32,315
„ „ debit „ „ ..		42,185
		<u>£74,500</u>

THE BEET SUGAR INDUSTRY IN GREAT BRITAIN

TABLE III.—BRITISH BEET SUGAR FACTORY INCOME, EXPENDITURE, AND PROFITS FOR THE YEARS ENDED MARCH 31, 1933 AND 1934. TOTAL OF ALL FACTORIES AND AVERAGES PER TON OF BEET WORKED.*

	Total		Per ton of beet	
	1932-3†	1933-4	1932-3	1933-4
INCOME, EXPENDITURE AND PROFITS:	£	£	s. d.	s. d.
Net income from sugar (<i>less</i> Excise Duty)	3,792,488	5,139,357	34 0	31 2
Molasses	94,510	118,444	0 10	0 8
Pulp	594,558	893,066	5 4	5 5
Lime Sludge	939	1,397	—	—
Total income from saleable products	4,482,495	6,152,264	40 2	37 3
Add subsidy	2,379,345	‡3,487,107	21 4	21 2
Total income	6,861,840	9,639,371	61 6	58 5
Less cost of beets	4,761,730	6,527,527	42 8 (69%)	39 7 (68%)
Balance from factories	2,100,110	3,111,844	18 10	18 10
Less manufacturing costs and overhead charges	1,444,940	1,970,393	(31%) 12 11	(32%) 11 11
Beet trading profit	655,170	1,141,451	5 11	6 11
Profit on subsidiary industries	— 28,061	82,644	— 0 3	0 6
Total profit	627,109	1,224,095	5 8	7 5
APPROPRIATIONS OF PROFIT:				
Interest charges	97,193	98,961	0 10	0 7
Directors' fees..	25,806	28,753	0 3	0 2
Depreciation	279,242	324,814	2 6	2 0
Income tax	37,555	163,269	0 4	1 0
Dividends	237,993	370,392	2 2	2 3
Reserves	108,850	163,406	1 0	1 0
Other appropriations \$	3,569	74,500	—	0 5
Total appropriations	790,208	1,224,095	7 1	7 5
Less				
Transfer from reserves	48,254	—	1 5	—
Amounts taken from credit balances at March 31, 1932	114,845	—		
Trading profit as above	627,109	1,224,095	5 8	7 5

MAY ON THE FARM

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IN describing spring as early or late, we are reminded of the fact that growth conditions and farm operations do not follow calendar dates very closely. In some years, weather conditions in May may resemble those normally prevailing in March. The countryman draws conclusions as to the earliness or lateness of a season from the condition of the hedgerows, pastures, etc.; some go further, and claim that it is even possible to forecast the summer weather from such observations as the relative dates of flowering and of breaking into leaf of certain plants. It is interesting to note that organized work is proceeding in many countries to add precision to this type of observation, and to extend its scope by taking note of crop yields, etc. A number of plants that are considered suitable for this purpose, such as the Hazel, are kept under observation in different parts of this country, and records are made of certain cardinal stages in their growth, such as dates of appearance of the first flower. When these phenological studies are completed, one of the most interesting ways in which it will be possible to apply them, will be in the preparation of notes of the farm calendar type.

At the time of writing, the mild conditions seem to promise an early spring. One is reminded, however, of the old adage, "March grass, May hunger." It is difficult to know whether this merely represents the pessimist's fear of a good beginning, or whether it is founded on experience. March grass might induce heavier stocking than usual in that month, and this would probably decrease the productivity of the pasture later in the spring. Experiments at Jealott's Hill and elsewhere indicate that hard grazing in the winter period has a harmful effect on the subsequent growth of grass. A cold, dry wind is a serious cause of grass shortage in May, and it rarely fails to convince the grazier that "May makes or mars a bullock." Failure to thrive on the part of the cattle is not the only way in which shortage of grass in that month affects the grazier. Fattening cattle will not be ready to be marketed before the rush of summer beef that commences in August, and it

MAY ON THE FARM

will be impossible to fatten two lots of cattle in a season, such as is practised on the best pastures.

Lambing Season.—Except on high grazings, especially in the north, the lambing season is practically over by the end of April. The flock-masters' anxieties, however, are by no means at an end. It is to be feared that lamb dysentery is spreading rather rapidly through the country; at any rate, one hears of it in many districts in which, until the last year or two, it was quite unknown. It also appears to be assuming a different form in some areas, and the preventive inoculation has not been so effective during the last year or two. The explanation appears to be that the very complex nature of the poison produced by the lamb dysentery germ has only recently been fully appreciated, and the need of a serum of similar complexity was not evident. The serum of the past two years failed to protect in some instances because it was lacking in an essential element. Evidence so far available suggests that with the newer knowledge the current serum is quite efficient. In any event, any farmer who is losing young lambs from what he suspects to be lamb dysentery, should at once seek expert advice.

Lamb dysentery is not likely to be the cause of death in lambs more than about 14 days' old; and, during April and May, a much more common cause of trouble in lambs is "pulpy kidney disease," which affects lambs 2 to 10 weeks' old. This usually causes almost sudden death, though the lamb may be noticed to stagger about for a short time before collapsing. Usually, such deaths are attributed to the presence of "wool balls" in the stomach. Actually, wool balls only cause trouble in a very small number of cases. If the contents of lambs' stomachs are examined in the slaughter-house, practically all will be found to contain wool balls, which obviously have not seriously affected the thriving of the animals, although in rare cases it is, of course, possible for them to cause obstructions, illness and death. In the great majority of these sudden deaths among lambs, the trouble is due to a special organism which has been thoroughly investigated both in New Zealand and in this country. It is closely related to the organism responsible for lamb dysentery; and it is a peculiarity of this group that the organism does not infect the tissues of the animal, but lives in the intestines, and,

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in certain circumstances, produces poisons that are extremely toxic. Favourable conditions for the production of these toxins appear to be created by an abundant supply of digestible food rich in protein; hence, trouble is most likely to be experienced when, after a spell of cold, dry weather, a nice warm rain induces rapid growth of rich young grass and consequently stimulates the flow of milk. Preventive inoculation is also being tested in connexion with this disease, and appears to be proving effective. On farms where trouble is usually serious, a careful watch on the growth of grass, and removal to poorer pastures at flush times, may prevent a certain amount of loss. Similarly, if the operations of castrating and tailing can be made to coincide with such a period of rapid growth, the check which the lambs necessarily receive by these operations may be turned to good account.

Castration, while essential in mountain flocks, is not often practised where grass lambs are reared and sold fat off their mothers. It is probable, however, that this operation would prove profitable on many lowland grazings where the pastures are not sufficiently good to enable the major part of the lambs to be fattened by the middle of August. Ram lambs do not thrive well even on good pastures in late summer, and butchers do not bid so well for these then as for wethers of similar weight.

Many flock-masters speak in praise of bloodless castration. The advantage claimed for this method is that it can be postponed until the lambs are even three or four months old, and that this results in a bigger lamb, with stronger bone. Another advantage is that it prevents the losses which sometimes happen when a cold, wet night follows knife castration. The disadvantage of the method is that it is not so certain as the older method. In addition, if the operation is delayed until the lambs are a few months old, it is not easy for a buyer to tell whether the operation has been successful until some weeks afterwards. An experiment was carried out at the Rowett Institute, Aberdeen, in 1932, to compare the two methods. Ten sets of twin male lambs were selected; one from each pair was knife castrated and the others done by the bloodless method. Those done by the latter method made superior gains in weight, and, at weaning time, averaged 59 lb. live weight, against 53 lb. in the case of those castrated by the knife.

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The tailing, or docking of lambs is carried out in most flocks where fat lambs are produced off the grass. It lessens the work of keeping the lambs free from maggots, and, besides, provides a useful way in large flocks of checking up the numbers of lambs in the different lots. Care should be taken not to put the knife on the ground in the intervals between tailing the different batches. Heavy losses have sometimes followed this operation, and these may have been caused by lack of cleanliness.

The ewes need much attention this month. The growth of rich, young grass causes scouring, and, in some years, fully a third of the ewes must be clipped around the tail and hindquarters. Failure to do this makes it difficult for the lamb to suck, and may also cause the udder skin to become inflamed.

Quality of Milk.—In many parts, May is the month when milk producers have their annual ordeal, in the form of the analysis of milk. The position of the farmer, in this respect, is unparalleled by that of any other business man, inasmuch as he has to face periodically the possibility of a charge of food adulteration because of conditions beyond his control, or because of failure to take certain precautions. Moreover, the taking of samples on a Monday morning, when a lower fat content might be expected because of the earlier milking that usually takes place on a Sunday afternoon, strengthens the opinions of many producers as to the difficulty of their position.

The raising of the fat content of milk has been the subject of much investigation. There is no simple remedy open to a farmer faced with this problem; the situation must be tackled by taking a number of precautions, i.e., by a modification of management. A producer who has cause to be apprehensive regarding quality of milk should send samples for a fat test to the advisory centre in his area; these are generally reported on for a small fee. If the morning's milk is below standard, an attempt to put things right should be made by milking later in the afternoon, by taking care that churns or bottles contain the mixed milk of several cows, and that all the strippings are put in with the rest of the milk. In some cases it may be necessary to track down one or two cows giving abnormally poor milk; some producers play for safety at this time of the year by retaining

MAY ON THE FARM

for the feeding of calves the first half gallon of the morning's milk from the heavier milkers. Another precaution is to include in the herd some Jersey or Guernsey cows.

Increasing the fat content of milk by modifications in the feeding of the cows can be almost ruled out as a practical measure. Small increases in the fat content as a result of modifying the feeding have, however, been observed. Thus, in Dutch experiments, as a result of feeding either palm nut cake or coconut cake, increases were obtained of 0.43 and 0.27 per cent. respectively, calculated on 100 parts of milk. Again, investigations from Shinfield, Reading, on herds consistently giving milk abnormally poor in fat and solids-not-fat, disclosed the fact that the only treatment which raised the quality of milk to normal was fresh young grass; this does not justify the disposition in some quarters to blame fresh grass for the low fat content often occurring in spring.

Swedes, Mangolds.—The sowing of swedes takes place at a time of the year, viz., latter part of May, and early in June, when the odds are heavily against having a sufficiently moist seed-bed. To add to the chances against a successful take, the attack of the Flea Beetle is intensified if growth slows down because of continued dry conditions. The extent to which the swede crop is grown, in spite of the high cost of production and of the numerous insect and fungus pests, bears testimony to the esteem in which this crop is held by the farming community.

Of late years, a new "disease" of swedes, called "Brown Heart" has come into prominence at home and abroad. It is probable that this disease is only new in the sense that it has escaped recognition until recently, and that swedes affected with it were regarded as having one of the other rots. The disease makes swedes unfit for sale for human consumption, the flesh being brown beneath the rind. No satisfactory data are available as to the loss in the palatability and nutritive value of swedes, when affected with Brown Heart, as a food for live stock, but it is probable that this is one of the diseases contributing to make swedes poor keepers.

The disease is now considered to be a physiological disorder arising from a deficiency of boron, as in the case of Crown Rot of sugar-beet. In experiments carried out by Whitehead last year, the disorder was completely controlled at one centre, and very much reduced at three other centres,

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by sprinkling borax at the rate of 10 lb. per acre after sowing. This is the smallest quantity that can be sprinkled by hand on an acre of drills. It would be easy for makers of compound manures to include a little borax in swede manures.

Most of the mangold crops will be showing above ground before May is out, and many will be ready for singling. In some districts much damage is caused by hares in the few weeks immediately after singling; only a small portion of each root is eaten, and it takes a large number of plants to provide the raider with a square meal. Insects are often blamed for the damage inflicted in this way, because, after the root has been bitten through, they are attracted to the cut surface by the aroma of the juice; by the time the farmer arrives on the scene the evidence against insects is very strong. Close observation, however, would fail to reveal any roots in the act of being severed by the insects.

This point was the subject of a friendly wager between a landowner, a staunch champion of the hare, and an advisory entomologist. The former was only convinced of the guilt of the hares when, after a portion of the crop had been fenced off to exclude them, the damage ceased in that portion. This is perhaps as important a lesson in the value of accurate observation and deduction as it is in crop protection.

Potatoes.—Work in the potato crop this month is confined to intertillage. This includes weed destruction, the loosening of the soil, and the throwing back of loose soil on the ridges. The remark is sometimes made that “it takes a Scotsman to grow heavy crops of potatoes.” If there is any distinguishing feature in the Scotsman’s method of potato culture, it is perhaps the continuous intertillage, carried on until the size of the haulms renders further work impossible. In this area, in particular, there is a tendency to regard further work in the potato crop as unnecessary after one hand and horse hoeing, earthing up, and pulling out the weeds by hand once during the summer. This point of view is entirely wrong. The provision of plenty of loose soil through repeated scuffling and earthing up helps to ensure a heavy crop of shapely tubers, and, if this is neglected, much of the benefits of good seed and good manuring is lost.

NOTES ON MANURING

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Straw Disposal.—In the Midlands and western parts of England, there is usually a shortage of straw; in the east of the country, the disposal of straw presents one of the most embarrassing problems of the arable farmer. In the grass land areas, the summer stocking of the grass is much too heavy for the straw that can be grown on the reduced, and sometimes negligible, acreage of arable land; and, during winter, methods for making the straw go as far as possible are very necessary, unless the stock is transferred to less strawless parts of the country.

When an arable district turns seriously to grass, as happened some years ago in the English Border country, the open yards are covered in to prevent the rain from wasting the straw, but they are still open to all weathers in the few remaining arable districts, where rain falling direct on the straw is welcomed in the perplexing problem of how to turn the straw into manure at the least expense.

The now well-known work at Rothamsted has indicated that there is a balance between the nitrogen and carbohydrates in the dung heap that best assures the rotting of the straw. Clearly this balance cannot be assured in the practice of dung-making of either the grassland or arable areas of England, and the wastage in consequence must be enormous; for there is little or no loss of manurial constituents when straw is rotted according to the method worked out by Hutchinson and Richards, at Rothamsted.

The arable farmer, however, finds great difficulty at present in justifying the process of making farmyard manure. The most difficult case is that of the partners in winter beef production—the store raiser and the winter feeder—the last-named having for generations placed much value on the dung produced by his fattening cattle. The horseless farmer is in a similar position, but for a different reason. He makes no attempt to rot down the straw with stock and prefers to sell it off the farm. As a rule he is not interested in live stock: they are awkward to fit into his farming system.

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Alternative methods of straw disposal are therefore being tried in practice. Straw is being ploughed in (with results that are not wholly encouraging): the old practice of strawing the sheep folds is being revived: straw is being strewn on the young seeds, which grow through and are eaten as the straw is trampled into the ground by the sheep; straw is being left in windrows and burnt; anything, in fact, to escape the labour of carting straw to the homestead, dung to the fields, and the financial difficulties of winter beef production.

Perhaps these notes are hardly the place to give a simple recital of current practical events. Their relevance to manuring, however, is obvious. Dung-making on the old methods seems still to be the best way to rot the straw so that it can be returned effectively and completely to the land, and the recent attempts to dispose of the straw without the intervention of horned stock may result in decreased production, unless much that has been taught about rotation farming is basally unsound.

Marrow-stemmed Kale.—This crop is one of the most valuable of those recently introduced. The probability is that more feed per acre can be grown from marrow-stemmed kale than from either mangolds or swedes. It is a gross feeder and responds remarkably in yield to good treatment. Practically the whole plant is edible, and it is generally agreed that the quicker the crop grows, and the heavier the yield, the less fibrous and more palatable is the resulting feeding stuff. Good treatment also increases the number and size of the leaves. These are important points, especially if the produce is to be fed to sheep as is usual, without any further preparation; and they are, of course, even more important if the mouths of the sheep are not in good condition.

Few manuring experiments have been carried out with marrow-stemmed kale, but those that can be quoted are modern and have had the advantage of the modern technique of field experimentation. While marrow-stemmed kale responds less, perhaps, to potash than mangolds, and less than swedes to phosphates, a basal dressing of these manures is desirable in practice. Remarkable results have followed the use of nitrogenous manures; and, at Jealott's Hill, profitable responses have been recorded to as much as 9 cwt. per acre of nitro-chalk. The application of the

NOTES ON MANURING

results of single centres is limited, but there seems no doubt that the Jealott's Hill figures would probably be repeated on many soils in this country, although it seems doubtful whether anyone would feel able to afford the outlay of as much as £3 10s. per acre on nitrogenous manures for marrow-stemmed kale. It is interesting to note, however, that experiments at Woburn and at the Midland College showed that profitable responses resulted from up to 4 cwt. of nitrogenous manure, the maximum quantity that was used. The evidence generally suggests that about 50 cwt. per acre more kale will result from the use of every additional cwt. of sulphate of ammonia or its equivalent.

The extent to which artificials are used for any forage crop depends to a great extent upon the possibility of using them on the farm completely and profitably. There is no point in forcing the yield of kale to such an extent that it cannot fully be used before the frost in some districts, or the spring growth in others, destroys its usefulness. Perhaps it is best, while we are awaiting further experiments on marrow-stemmed kale, to suggest 4 cwt. of nitrogenous manure as a useful compromise, that, with adequate phosphates, potash, and dung would produce satisfactory crops.

The time for applying nitrogenous manure to the kales generally is important on practical rather than on scientific grounds. No doubt as good results would be obtained by putting the whole of the manure on the seed-bed as by dividing the total quantity say into three dressings, but few farmers would take the former risk. The kales are subject to many enemies in the early stage of their growth and repeated sowings are not uncommon occurrences. Turnip fly, birds, and vermin, will all take their toll, which is sufficient reason for dividing the application of nitrogenous manures into two or three dressings, part on the seed-bed, and part applied later. There is no reason to suppose that the manuring of thousand-headed kale differs essentially from that of marrow-stemmed kale, but as the former variety is inevitably used for sheep, it becomes all the more important to ensure a good type of food by good treatment.

Retrospect.—In writing these notes, it is not easy to visualise the reader's requirements. Is he primarily interested in manuring as a science, or does he require nothing but practical guidance? It has been assumed for

NOTES ON MANURING

the past few months that these notes are compiled for the benefit of practising men. Farmers are not always interested in the why and wherefore of manuring and quite a number are content merely to be told what to do.

Misconceptions and uncanny fears of the subtle effects of manures on some crops are not uncommon, and produce the frame of mind instanced recently by a man who said: "I don't want to grow more than 7 tons of beet to the acre because it sucks my land."

Those, and similar opinions are held by men who have obviously been denied the opportunity of studying one of the most important of the agricultural sciences. Usually, it is too late in their lives to teach them the first principles of the subject, and perhaps the best practical advice is to prescribe for their farms two mixtures of the standard fertilizers, for the approximate needs of most crops and farms can be met that way. Under some conditions, the procedure would be slightly incorrect, but it will never be hopelessly wrong. There is after all not much difference, according to our present knowledge between the manurial requirements, for instance, of mangolds, sugar-beet, potatoes, the kales and Brussels sprouts, in one group; and barley, swedes, turnips and wheat (without dung) in the second group. Two mixtures designed separately for these groups, the use of the highest quality manures and a firm determination to top-dress anything that appears likely to need it, enables oats to be included in the second group and the range of most arable crops to be covered. The procedure would occasionally be a little expensive, but it is simple, easy in practice, time-saving, and in most cases it is not inappropriate, for the practice of manuring is not an exact science.

The basis of successful advice on manuring is almost entirely the result of experimental work carried out at various centres in this and other countries, ranging over a long period of years.

Some of the older experiments, despite the comparatively rough methods (according to modern technique) by which they were conducted, are still the most valuable. It is feared, however, that the results of many of them have been forgotten and much effort is wasted, in county experiments, by the present generation in reinvestigating simple manuring problems that have been previously studied.

NOTES ON MANURING

Fifty years ago there was a comprehensive scheme of agricultural experiments being carried out in Norfolk; and the Norfolk Chamber of Agriculture reported, in 1887, that "the most economical manure for barley on light land soil in Norfolk from which turnips (swedes) have been drawn is 2 cwt. superphosphate, $\frac{1}{2}$ -1 cwt. of muriate of potash and 1-2 cwt. of nitrate of soda or $\frac{3}{4}$ -1 $\frac{1}{2}$ cwt. of sulphate of ammonia when its unit value is lowest per unit of nitrogen."

In the same summary, swedes, it is suggested, should be manured with 2-4 cwt. superphosphate, 1 cwt. of sulphate of ammonia and $\frac{1}{2}$ cwt. of muriate of potash per acre.

In 1891, it was recommended that mangolds should receive 2 cwt. nitrate of soda, 3 cwt. of salt and 2 cwt. of superphosphate, and that "in warmer localities, where larger crops than 25-30 tons per acre of mangolds are habitually grown, it would pay to increase or to double the above quantity of nitrate of soda."

Few would quarrel on practical grounds with those recommendations to-day.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended April 10				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
„ „ Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia,					
Neutral (N. 20.6%) ..	7 5d	7 5d	7 5d	7 5d	7 0
Calcium cyanamide (N. 20.6%) ..	7 5e	7 5e	7 5e	7 5e	7 0
Kainite (Pot. 14%) ..	3 0	2 14	2 12	2 14g	3 10
Potash salts (Pot. 30%) ..	4 11	4 6	4 4	4 6g	2 10
„ (Pot. 20%) ..	3 12	3 6	3 3	3 6g	3 4
Muriate of potash (Pot. 50%) ..	7 4	6 16	6 12	6 16g	2 9
Sulphate „ „ (Pot. 48%) ..	8 3	7 18	7 12	7 18g	3 3
Basic slag (P.A. 13½%) ..	2 10c	2 0c	..	2 6c	2 11
„ (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26.27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16k	3 6
„ (S.P.A. 13½%) ..	2 15	2 11	2 15f	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 15f	6 7	..
Steamed bone-flour (N. 4½%, P.A. 27½-29½%) ..	5 12	5 12	5 10f	5 10	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid
Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 2-ton lots, net cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

‡ Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

§ Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

¶ For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

|| Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt., 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails, 2s. 6d. extra.

h Prices shown are f.o.r. northern rails; southern rails, 1s. 3d. extra.

NOTES ON FEEDING

W. B. MERCER, M.C., B.Sc.,
(Principal) and Colleagues, Cheshire School of Agriculture,
Reaseheath, Nantwich.

Pig Feeding.—In agriculture the science of production has, until recently, been well ahead of marketing. Momentarily, the boot is on the other leg in pig husbandry. We have got a system of marketing, scientific at least in form, before science can point the way to the production of Grade A pigs. Not that fundamental research on animal growth has been neglected. A good deal has been achieved since the War. But the underlying themes have not been grading, the standards of measurement have not been the industrial or trading standards of the Marketing Board. One gets, therefore, from a study of current research a view of fundamentals rather than a practical lead. The research needs a good deal of interpretation in terms of the grader's standards. Unfortunately, it is not quite clear what, in terms of animal morphology, the different grades mean. Thickness of shoulder fat is *probably* correlated with general body fatness; so that a good back grade means a lean body. A thick flank, however, may mean either a lean or a fat belly. The measures adopted are after all mere trading devices. They could, conceivably, be so ordered as to make the attainment of top grade in respect of both belly and back impossible in one and the same animal. Probably, however, one is not very wide of the mark in regarding the belly measurements as a rough and ready index of muscle development.

Heredity.—There is not a great deal of genetical evidence concerning the effect of heredity on muscle development, though what there is suggests that that factor is directly transmissible. For the most part, however, one must rely on circumstantial evidence; and that, as Lord Riddell observed, may sometimes be so strong as to amount to proof—"as for instance finding a trout in the milk." It is scarcely conceivable that the type of hog produced in the corn belt of America could have been changed so rapidly had not fleshiness been a heritable factor. No doubt selection has been important also; but

NOTES ON FEEDING

selection without inheritance of desired characters would have led nowhere.

Growth Rate.—The main factor in successful feeding appears to be continuous but *controlled* growth rate. The animal body is never static; even when weight is not increasing, development is still going on. A check in normal development means an abnormal body—as witness the huge heads of “bad doers.” Like the sins of youth, malnutrition and illness in early life leave their marks on the adult body. Hammond has cited evidence to show that the development of the loin and of muscle generally, is permanently affected by a check at weaning. This observation puts in a very different light the current belief in the feeding of pigs that have had a long “store” period. Good grading results, it would seem, are not likely to be obtained with such animals though the growth rate during fattening may be all that one could desire. Clearly also the weaning period is of even greater importance than has hitherto been supposed.

Accessory Factors.—We now know from G. Dunlop's work that the risk of vitamin A shortage is a real one. It is clear from his work that many of our standard fattening rations are distinctly poor in this accessory, and animals thrive on such rations only if they have in early life laid up a reserve of vitamin in their bodies. Fortunately vitamin A is easily supplied. Yellow maize is rich in the precursor carotene, and lucerne meal, now making its way into favour among pig breeders, is also rich in this substance. British manufacturers of lucerne meal claim that the artificially dried product of this country is much richer in carotene than the sun-dried product of other lands; and we see no reason to question the claim since American research has shown that artificial drying preserves carotene better than sun drying.

Minerals.—As one of the first fruits of the method of experimentation he designed, Dunlop has also published a critical review of existing information on the pig's requirements in lime and phosphoric acid. As is well known the amount of lime necessary for healthy growth depends in part on the amount of phosphoric acid supplied. Certain ratios between the two must be preserved. Rickets is generally attributable to shortage of lime, but it is sometimes caused by excess of lime in relation to phosphoric acid. He considers that under normal feeding conditions

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the optimum ratio is 1 calcium : 1.3 phosphorus, the calcium being supplied at the rate of .45 per cent. in the dry matter. This corresponds approximately to .56 per cent. lime (CaO) in the meal mixture and a $\text{CaO}/\text{P}_2\text{O}_5$ ratio of 1/2. His recommendation as to the optimum ratio does not differ materially from that recommended by other workers; but his insistence on the narrow margin of safety is an important warning.

In practice it will be found convenient, when applying these recommendations, to calculate first the phosphoric acid content of the mixture and to adjust the ratio by adding an appropriate quantity of limestone; for cereals and their offals are all relatively rich in phosphoric acid and (as Crowther showed some years ago) there is little fear with an ordinary mixture of any shortage of this mineral. Indeed, if one accepts Wood and Halnan's figures* for middlings as true for weatings, most meal mixtures containing over 30 per cent. of this feed contain rather too much phosphoric acid. It is impossible, however, to adjust any mixture containing 10 per cent. of fish meal to the prescribed standards, since that constituent by itself supplies over 1 per cent. CaO.

We have calculated the lime requirement of a number of ordinary feeding mixtures and give below two typical results:—

	<i>Per cent.</i>	<i>CaO.</i>	<i>P₂O₅.</i>
Barley meal	20	.014	.168
Weatings (middlings) ..	40	.04	1.04
Indian meal	30	.006	.246
Decorticated earth nut ..	10	.02	.13
CaCO ₃	1½	.7	—
		780	1.584
Barley	30	.021	.252
Weatings (middlings) ..	25	.025	.650
Indian meal	30	.006	.246
Sep. milk	15	.280	.336
CaCO ₃	½	.42	—
		752	1.484

It would seem that the current practice of adding about 2 lb. of limestone or chalk to 1 cwt. of a mixture of vegetable meals generally errs on the side of generosity, 1 lb. per cwt. being in general the optimum quantity, while the well-known 65—25—10 containing fish meal is well balanced though over rich in both minerals.

* Rations for Live Stock (8th Edition), p. 59.

NOTES ON FEEDING

Growth Rate and Food Consumption.—In the past it has been customary to judge feeding results on the basis of the amount of meal consumed per pound of live weight gain. To this consideration must now be added that of the effect of different growth rates on the composition of the adult carcass. The results at the Midland Agricultural College, published by Robinson in the March issue of this JOURNAL, appear at first glance to contradict flatly those given earlier from the Reaseheath herd. It is, however, impossible to judge either set of figures fairly in the absence of precise information on food consumption per pig.

There is evidence from research centres (admittedly not unanimous evidence) that the maximum rate of feeding is not the optimum where quality of carcass is under consideration. In the United States, for instance, it has been found that restriction of feed to $\frac{3}{4}$ or even $\frac{1}{2}$ the animal's appetite had the effect of decreasing the meal consumption per pound of increase and also increasing somewhat the percentage of lean in the meat.

To the writers, it seems clear that, in future, rationing of feeding pigs, according to a definite schedule based on the live weights will take the place of the existing custom of feeding according to appetite. This may and probably will involve division of the animals into smaller groups than hitherto.

Protein in Wheat.—Chemists constantly remind us that the tables of composition of foodstuffs are but average figures, and that in practice considerable divergencies from the averages may be encountered. How great this variation may be is well illustrated by Shutt's recently published summary of observations on the composition of the wheat grain in Canada. In 1918 the N content of Marquis wheat in experimental plots, scattered throughout the Dominion, varied from 3.55 to 1.77 per cent.—that is to say, 50 per cent. above and below the mean.

A good deal of attention has been paid to the mechanism of the filling of the cereal grain—the point is of immense importance to the milling and brewing industries—and it is known that under a given set of conditions the grain fills up evenly, the plant as it were passing its elaborated carbohydrate and protein through a mould into the developing berry. The shape of the mould varies with different varieties, American strains in general containing higher

NOTES ON FEEDING

proportions of protein than English. Environmental conditions also distort the shape; high nitrogen manuring tends to give a grain rich in protein; Shutt's experiments make it clear that the mould varies also with harvest weather, hot dry conditions resulting in a higher gluten content than when ripening takes place under moist cool conditions. It is generally thought that temperature is on the whole a more important factor than rainfall, as this mainly determines the length of the period of grain formation. Pelshenke reports that the gluten content of German wheat in 1934 was much higher than in the three previous years; our own harvest of last year appears also to have been abnormal in this respect.

Grassland Research.—Never in man's history has the exchange of ideas been so easy as at present; and agricultural science can boast a fine example in the federation of mind. Tiny streams of thought issuing from research centres and experimental farms coalesce to form a river; the river is joined by tributaries from other lands, more and yet more pour in, and on the waters roll "till like a sea of glory it spreads from pole to pole."

The cynic it is true will point out that this state of affairs admits of two interpretations; it may mean that scientific men are grown world-minded; it may also mean they are so devoid of originality that they borrow one another's ideas, and intellectually live by taking in one another's washing. He might, for instance, inquire who really started the present furore about grass land; and why since the major part of the earth's surface consists of grazing land nobody troubled to inquire into the bionomics of grazing until ten years ago. To-day, it is difficult to find a national review of agricultural research that does not stress grass land investigations. Admittedly, Canada still places wheat in the forefront; but change only a few words of State reports from New Zealand, Australia, South Africa, America, and whole sections could be read as home memoranda. Everywhere intensive grazing methods are being prosecuted. What will be the end of it all? Apparently Pharaoh's dream is to be reversed; it is the seven *fat* kine we have to fear!

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	4 17	0 8	4 9	72	1 3	0.67	9.6
Barley, British feeding	5 15	0 7	5 8	71	1 6	0.80	6.2
" Canadian, No. 3 Western ..	6 8	0 7	6 1	71	1 8	0.89	6.2
" Argentine	5 5*	0 7	4 18	71	1 5	0.76	6.2
" Danubian	5 5*	0 7	4 18	71	1 5	0.76	6.2
" Persian	5 10	0 7	5 3	71	1 5	0.76	6.2
" Polish	5 10	0 7	5 3	71	1 5	0.76	6.2
Oats, English, white	7 0	0 8	6 12	60	2 2	1.16	7.6
" black and grey	7 0	0 8	6 12	60	2 2	1.16	7.6
" Scotch, white	7 8	0 8	7 0	60	2 4	1.25	7.6
" Canadian, No. 2 Western ..	7 13	0 8	7 5	60	2 5	1.29	7.6
" No. 3	7 13*	0 8	7 5	60	2 5	1.29	7.6
" mixed feed	6 13	0 8	6 5	60	2 1	1.12	7.6
" Chilian	7 10½	0 8	7 2	60	2 4	1.25	7.6
Maize, Argentine	4 17	0 6	4 11	78	1 2	0.62	7.6
" Danubian, Gal. Fox	5 3†	0 6	4 17	78	1 3	0.67	7.6
" South African, No. 2 White Flat	5 2†	0 6	4 16	78	1 3	0.67	7.6
" South African, No. 4 Yellow	5 12†	0 6	5 6	78	1 4	0.71	7.6
Beans, English, winter	6 0½	0 16	5 4	66	1 7	0.85	10.7
Peas, English, blue	7 10½	0 14	6 16	69	2 0	1.07	18.1
" Indian	9 0†	0 14	8 6	69	2 5	1.29	18.1
" Japanese	13 0†	0 14	12 6	69	3 7	1.92	18.1
Darl	7 2†	0 7	6 15	74	1 10	0.98	7.2
Milling offals—Bran, British ..	5 7	0 14	4 13	43	2 2	1.16	9.9
" broad	5 17	0 14	5 3	43	2 5	1.29	10
Middlings, fine, imported ..	5 5	0 12	4 13	69	1 4	0.71	12.1
Weatings†	5 7	0 13	4 14	56	1 8	0.89	10.7
" Superfine†	6 0	0 12	5 8	69	1 7	0.85	13.1
Pollards, imported	5 0	0 13	4 7	50	1 9	0.94	11
Meal, barley	7 5	0 7	6 18	71	1 11	1.03	6.2
" grade II	6 10	0 7	6 3	71	1 9	0.94	6.2
" maize	5 10	0 6	5 4	78	1 4	0.71	7.6
" South African	5 5	0 6	4 19	78	1 3	0.67	7.6
" germ	5 12	0 10	5 2	79	1 3	0.67	8.5
" locust bean	7 10	0 5	7 5	71	2 1	1.12	3.6
" bean	8 5	0 16	7 9	66	2 3	1.21	19.7
" fish, white	13 15	2 0	11 15	59	4 0	2.14	53
Maize, cooked, flaked	6 2	0 6	5 16	84	1 5	0.76	9.2
" gluten feed	6 0	0 12	5 8	76	1 5	0.76	19.2
Linseed cake, English, 12% oil ..	8 7	0 19	7 8	74	2 0	1.07	24.6
" " " 9% "	8 0	0 19	7 1	74	1 11	1.03	24.6
" " " 8% "	7 15	0 19	6 16	74	1 10	0.98	24.6
" " " 6% "	8 2½	0 19	7 3	74	1 11	1.03	24.6
Soya-bean cake, 5½% oil	7 12½	1 6	6 6	69	1 10	0.98	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 12	0 16	3 16	42	1 10	0.98	17.3
" " Egyptian, 4½% "	4 2	0 16	3 6	42	1 7	0.85	17.3
" " decorticated, 7% " ..	7 2†	1 6	5 16	68	1 8	0.89	34.7
" meal, decorticated, 7% " ..	7 0†	1 6	5 14	68	1 8	0.89	34.7
Coconut cake, 6% oil	6 10	0 16	5 14	77	1 6	0.80	16.4
Ground-nut cake, 6.7% oil	6 0*	0 17	5 3	57	1 10	0.98	27.3
" " decor., 6.7% oil	7 0	1 6	5 14	73	1 7	0.85	41.3
" " imported, decorticated, 6.7% oil ..	6 7	1 6	5 1	73	1 5	0.76	41.3
Palm-kernel cake, 4½-5½% oil ..	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " meal, 4½% oil	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " meal, 1.2% oil	5 17	0 11	5 6	71	1 6	0.80	16.5

PRICES OF FEEDING STUFFS (*continued*)

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Feeding treacle	5 0	0 7	4 13	51	1 10	0.98	2.7
Brewers' grains, dried ale ..	5 15	0 10	5 5	48	2 2	1.16	12.5
" porter ..	5 7	0 10	4 17	48	2 0	1.07	12.5
Dried sugar-beet pulp (a) ..	5 15	0 5	5 10	66	1 8	0.89	5.2

(a) Carriage paid in 5 ton lots. * At Bristol ‡ At Hull. † At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the beginning of April, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.129d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices—N., 7s. 6d.; P₂O₅, 2s. 1d.; K₂O 2s. 11d.

Farm Values.—The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	5 12
Maize	78	7 6	4 17
Decorticated ground-nut cake ..	73	41.3	6 13
" cottonseed cake ..	68	34.7	7 2

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1.42 shillings, and per unit protein equivalent, 1.24 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

MISCELLANEOUS NOTES

Crop	Starch equivalent	Protein equivalent	Food value per ton, on farm	
	Per cent.	Per cent.	£	s.
Wheat	72	9.6	5	14
Oats	60	7.6	4	15
Barley	71	6.2	5	9
Potatoes	18	0.8	1	7
Swedes	7	0.7	0	11
Mangolds	7	0.4	0	10
Beans	66	19.7	5	18
Good meadow hay	37	4.6	2	18
Good oat straw	20	0.9	1	10
Good clover hay	38	7.0	3	3
Vetch and oat silage	13	1.6	1	0
Barley straw	23	0.7	1	14
Wheat straw	13	0.1	0	19
Bean straw	23	1.7	1	15

MISCELLANEOUS NOTES

Use of Electricity in Forcing Flowers

MR. E. G. JOHNSON, an agricultural engineer of Spalding, has been carrying out some interesting experiments with a new type of electrically-heated frame for forcing daffodil and tulip bulbs.

The frame, which resembles a model glasshouse of conventional shape, has some novel features. It is portable and can be joined up into required lengths by means of sections. Leakage of heat at joints is avoided by the use of a special type of rubber strip carrying suction pads. The heat is controlled by a thermostat.

In practice, the bulbs are planted directly into the soil, close together, boxes not being used. The frame is placed over these beds, and after these have been forced it is moved on to other beds in succession. The bulbs are allowed to grow on naturally after forcing.

It is claimed that this system reduces the overhead charges involved in bulb forcing. This is due to the saving in labour, the fact that boxes are not used, and the saving of the forced bulbs. It shows distinct possibilities in view of the cheapening of electric power for horticultural purposes. Full costings data are not yet available.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE March general index number of the prices of agricultural produce was 112 (corresponding month of 1911-13 = 100) or 3 points lower than in February and 4 points higher than in March, 1934, and 10 points above March, 1933. (If allowance is made for payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act, the index for March would be 119.) During the month under review the majority of commodities were cheaper than in February, but the principal causes of the fall of 3 points in the general figure were the reductions in the wholesale price of liquid milk and in the value of fat cattle. Fat pigs, barley, potatoes, hay and wool also contributed to the fall. Fat sheep on the other hand were dearer.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1930.	1931.	1932.	1933.	1934.	1935.
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	—
May	134	122	115	102	112	—
June	131	123	111	100	110	—
July	134	121	106	101	114	—
August	135	121	105	105	119	—
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

Grain.—At 4s. 7d. per cwt. the average for wheat showed a fall of 1d. and the index declined 1 point to 62. (If allowance is made for the “deficiency payment” under the Wheat Act, 1932, the index would be raised to 121.) Barley was substantially cheaper during March, a fall of 8d. in the average price to 7s. 6d. per cwt. causing the index to fall 6 points to 5 per cent. below the pre-war level. Oats at 6s. 10d. per cwt. were 2d. cheaper on the month and the index at 96 was 3 points lower. At the corresponding period last year, wheat was selling at an average of 4s. 4d., barley 8s. 9d., and oats 6s. 2d. per cwt., the indices being 58, 111 and 87 respectively.

Live Stock.—Values for fat cattle, which normally show a slight rise in price in March, continued to fall during the month, the average for second quality declining by 5d. to 30s. 11d. per live cwt. and the index fell 3 points to 88. (The effect of adding the cattle subsidy would be to raise

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the index to 102.) A year ago the average price was 34s. 9d. and the index stood at 99. The upward movement in the prices of fat sheep has continued, an increase of $\frac{3}{4}$ d. per lb. in the average price of second quality causing the index to advance 5 points to 139. Following upon a rise of 7d. per score in February, the average price of second quality bacon pigs at 11s. 5d. per score was 3d. lower, and this was reflected in a fall of 6 points in the index to 114. Porkers were 6d. per score cheaper and the index was 5 points lower at 120. A decrease of about 15s. per head was noticeable in the price of dairy cows and the index was 1 point lower at 101. Store cattle and sheep were dearer than in the preceding month and the indices were 2 and 4 points higher at 86 and 113 respectively. Average values for store pigs were a little lower, but in consequence of a rise in price in the base period the index declined by as much as 12 points to 30 per cent. above the pre-war level.

Dairy and Poultry Produce.—In all regions the wholesale contract price for liquid milk was 1d. per gallon lower than in February, with the result that the index fell 10 points to 161. In the corresponding period last year the price declined 2d. per gallon and the index 20 points to 141. Butter was unchanged on the month, but the index rose by 2 points to 88, as a fall in values occurred in the base period. Quotations for cheese were slightly lower during March and the index declined 3 points to 91. Prices for eggs followed the usual seasonal trend, and the decline of about 3 $\frac{3}{4}$ d. per dozen was reflected in the drop of 2 points in the index to 94; this index was, however, 5 points higher than a year ago. Fowls and ducks were dearer, the respective indices moving upwards by 3 points, but the index for geese was 6 points lower, and the combined index for poultry was unchanged at 124, or 2 points below the figure recorded at the same period last year.

Other Commodities.—During March prices of potatoes showed a further decrease, the index declining 8 points to 108, which compares with a figure of 97 for March last year. Hay was a little cheaper during the month under review, but the combined index was 1 point higher at 103. Values for wool depreciated, and at 83 the index was 4 points lower. Cabbage and cauliflowers were dearer than in the preceding month, and the index for vegetables generally was 8 points higher at 139.

MISCELLANEOUS NOTES

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity	1933	1934		1935		
	Mar.	Mar	Dec.	Jan.	Feb.	Mar.
Wheat	69	58	66	65	63	62
Barley	79	111	104	101	101	95
Oats	84	87	95	100	99	96
Fat cattle...	105	99	90	95	91	88
" sheep...	112	118	119	140	134	139
Bacon pigs ...	110	127	107	117	120	114
Pork	118	131	124	128	125	120
Dairy cows ...	109	101	103	105	102	101
Store cattle ...	103	86	82	87	84	86
" sheep	85	91	99	111	109	113
" pigs	122	143	148	151	142	130
Eggs	101	89	97	95	96	94
Poultry	129	126	110	121	124	124
Milk	129	141	171	171	171	161
Butter	93	84	82	83	86	88
Cheese	110	116	93	97	94	91
Potatoes	106	97	133	121	116	108
Hay	66	81	104	101	102	103
Wool	62	98	84	88	87	83

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	132	128	123 ^o	123 ^o	121	121
Fat Cattle...	—	—	103	110	105	102
General Index ...	106	112	120 ^o	124 ^c	122	119

^o Superseding figures previously published.

“ Some Pig-grading Results ”

IN the article, “ March on the Farm,” in the March, 1935, issue of this JOURNAL, page 1224, in a note on the recent Pig Conference at the Moulton Farm Institute, Mr. H. E. Shand, of Messrs. R. Silcock and Sons, Ltd., was reported as having “ suggested a correlation between bonus carcasses and the heavier pigs of the litter at 21 days’ old.” Mr. Shand informs the Ministry that he suggested “ a correlation between bonus carcasses and the heavier pigs of the litter at *weaning time* at eight weeks, and not at 21 days ”; and, further, that the reference was only to the back fat measurement and not to the belly.

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Advisory Leaflets

SINCE the date of the list published in the February, 1935, issue of this JOURNAL (p. 1127), the undermentioned Advisory Leaflets have been issued by the Ministry:—

- No. 52. The Suppression of Weeds. (Revised.)
- No. 69. Cabbage Caterpillars. (Revised.)
- No. 86. The Greenhouse White Fly.
- No. 91. The Mangold Fly. (Revised.)
- No. 169. The House Sparrow. (Revised.)
- No. 228. A Substitute for Dishorning.
- No. 230. Town Refuse as Manure.
- No. 232. Liquid Manure Tanks.
- No. 233. The Beet Eelworm.
- No. 234. The Hawfinch and the Bullfinch.
- No. 235. Chafer Beetles.
- No. 236. Commercial Horticulture: Advice to Beginners.
- No. 242. The Magpie, the Jackdaw and the Jay.
- No. 243. Making Silage without Buildings.
- No. 244. The Rook.

Copies of any of the above-mentioned leaflets can be purchased from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or at the Sale Offices of that Department at Edinburgh, Manchester, Cardiff and Belfast, price 1d. each net (1½d. post free), or 9d. net per doz. (10d. post free).

Single copies of not more than 20 leaflets can, however, be obtained, free of charge, on application to the Ministry. Further copies beyond this limit must be purchased from H.M. Stationery Office, as above.

A list of the Ministry's publications, including leaflets, on agriculture and horticulture can be obtained free and post free on application to the Ministry.

Agricultural Research Scholarships and Studentships for Research in Animal Health

THE Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland invite applications for the following *post-graduate* Agricultural Research Scholarships and Studentships for Research in Animal Health, tenable as from October 1, 1935, for a period not exceeding three years:—

- (i) Three Agricultural Research Scholarships, each of the value of £200 per annum, to which will be added, if necessary, a sum not exceeding £50 per annum for fees and expenses.
- (ii) Three Studentships for Research in Animal Health, each of an *inclusive* value not exceeding £300 per annum.

Applications must be received not later than June 15 next. Nomination forms and further particulars may be

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obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, or from the Secretary, Department of Agriculture for Scotland, York Buildings, Queen Street, Edinburgh 2, according to the country in which the candidate resides.

Farm Workers' Minimum Rates of Wages.—Meetings of the Agricultural Wages Board were held at Kings Buildings, Smith Square, London, S.W.1, on April 9 and 23, 1935, the Rt. Hon. the Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Buckinghamshire.—An Order fixing minimum and overtime rates of wages to come into force on April 28, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until April 25, 1936. The minimum rates for male workers of 21 years of age and over are 32s. (instead of 31s. as at present) per week of 50 hours in summer except in the weeks in which Easter Monday, Whit Monday, and Accession Day (May 6, 1935) fall, when the hours are 41, and 48 hours in winter except in the week in which Christmas Day and Boxing Day fall, when the hours are 31, with overtime unchanged at 9d. per hour on weekdays and 11d. per hour on Sundays, Easter Monday, Whit Monday, Christmas Day, and Boxing Day, and on Accession Day (May 6, 1935). The minimum rate for female workers of 18 years of age and over is 6½d. per hour (instead of 6d. per hour as at present) with overtime unchanged at 7½d. per hour on weekdays and 9d. per hour for all employment on Sundays, Easter Monday, Whit Monday, Christmas Day, and Boxing Day, and on Accession Day (May 6, 1935).

Lancashire.—An Order fixing minimum and overtime rates of wages to come into operation on May 1, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in force until April 30, 1936. The minimum rates for male workers of 21 years of age and over are in the Southern Area, stockmen and teamsmen 36s. (instead of 35s. as at present) per week of 52½ hours; other workers 32s. 9d. (instead of 32s. as at present) per week of 50 hours; and in the remainder of the area of the Committee, stockmen and teamsmen 39s. (instead of 38s. as at present), and other workers 36s. 6d. (instead of 35s. 6d. as at present) per week of 60 hours in each case. The overtime rates for all classes of adult male workers are 9d. per hour on weekdays and 1s. 1½d. per hour for employment (other than time necessarily spent in the immediate care of and attention to stock) on Sundays (instead of 9d. per hour for all overtime employment as at present). The minimum rate for female workers of 18 years of age and over remains unchanged at 6d. per hour.

Leicester and Rutland.—An Order varying as from April 14, 1935, the existing minimum and overtime rates of wages. The minimum rates of wages for male workers of 21 years of age and over are 33s. per week of 54 hours throughout the year (as at present) in Leicestershire, and 31s. 6d. per week of 54 hours in summer and 51½ hours in winter (instead of 54 hours throughout the year as at present) in Rutland, the overtime rates in both counties being unchanged at 9d. per hour on weekdays and 11d. per hour on Sundays. The minimum rate for female workers of 18 years of age and over remains unchanged at 5d. per hour with overtime at 8d. per hour for Sunday work.

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Lincolnshire (Holland).—An Order cancelling the existing minimum and overtime rates of wages and fixing fresh rates in substitution therefor to come into operation on April 14, 1935, and to continue in force until October 26, 1935. The minimum rates for male workers of 21 years of age and over are 34s. (instead of 33s. as at present) per week of 50 hours except in the weeks in which Easter Monday and August Bank Holiday fall, when the hours are 41. For horsemen, cattlemen, and shepherds of similar age additional weekly sums are fixed to cover all time worked in excess of the number of hours mentioned above, except employment which is to be treated as overtime employment. The overtime rates for male workers of 21 years of age and over are 10½d. per hour on Saturdays (or any other day agreed as the weekly short day), 1s. 1½d. per hour on Sundays, 8d. per hour on Easter Monday and August Bank Holiday, and 9d. per hour for all other overtime employment. The minimum rate for female workers of 15 years of age and over is 6d. per hour for all time worked.

Northamptonshire and Soke of Peterborough.—An Order fixing minimum and overtime rates of wages to come into force on April 28, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until April 25, 1936. The minimum rates for male workers of 21 years of age and over are 31s. 6d. (instead of 30s. as at present) per week of 50 hours in summer, except in the weeks in which Easter Monday and Whit Monday fall, when the hours are 41, and 48 hours in winter except in the week in which Christmas Day falls when the hours are 39½, with overtime unchanged at 9d. per hour on weekdays and 11d. per hour on Sundays, Christmas Day, Easter Monday and Whit Monday. The minimum rate for female workers of 18 years of age and over is 6½d. (instead of 6d. as at present) per hour, with overtime unchanged at 7½d. per hour on weekdays and 9d. per hour on Sundays, Christmas Day, Easter Monday and Whit Monday.

Nottinghamshire.—An Order varying the existing minimum and overtime rates of wages to come into force on April 14, 1935. The minimum rate for male workers of 21 years of age and over is 32s. per week of 50 hours throughout the year (instead of 50 hours in winter and 52½ hours in summer as at present) with overtime at 9½d. per hour on weekdays and 11½d. per hour on Sundays. The minimum rate for female workers of 18 years of age and over remains unchanged at 5d. per hour with overtime at 8d. per hour.

Sussex.—An Order fixing minimum and overtime rates of wages to come into force on April 15, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until April 5, 1936. The minimum rates for male workers of 21 years of age and over are for workers employed wholly or mainly as horsemen, cowmen, stockmen or shepherds, 37s. (instead of 36s. as at present) per week of 58 hours except in the weeks in which Good Friday, Whit Monday, and Christmas Day fall, when the hours are 50, and for other workers 32s. (instead of 31s. as at present) per week of 52 hours in summer, except in the weeks in which Good Friday and Whit Monday fall when the hours are 44, and 48 hours in winter except in the week in which Christmas Day falls when the hours are 40. The overtime rates for all classes of adult male workers are unchanged at 9d. per hour on weekdays and 10½d. per hour on Sundays. The minimum rate for female workers of 18 years of age and over is 5d. per hour with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays as at present.

APPOINTMENTS

Merioneth and Montgomery.—An Order fixing minimum and overtime rates of wages to come into force on May 1, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until April 30, 1936. The minimum rate for male workers of 21 years of age and over employed wholly or mainly as stockmen, teamsters, carters, or shepherds is 32s. 6d. (instead of 31s. as at present) per week of 60 hours, and for other male workers of 21 years of age and over 28s. 6d. (instead of 27s. as at present) per week of 54 hours with overtime in each case unchanged at 9d. per hour. In the case of female workers of 18 years of age and over the minimum rate remains unchanged at 5d. per hour for all time worked.

Enforcement of Minimum Rates of Wages.—During the month ending April 14, 1935, legal proceedings were taken against nine employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area.	Court.	Fines imposed.	Costs allowed.	Arrears of wages ordered.	No. of workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Lancs. ...	Widnes ...	2 0 0	—	58 16 3	4
Leics. ...	Hinckley ...	*	1 1 6	31 4 6	1
Yorks, N.R.	Bedale ...	7 0 0	5 0	49 12 6	1
Kent ...	Bromley ...	12 0 0	1 1 0	40 0 0	2
Glam. ...	Cowbridge	3 0 0	3 6 6	21 9 2	3
Suffolk ...	Woodbridge	6 0 0	3 3 0	6 6 8	3
Yorks, N.R.	York Castle	2 0 0	5 0	4 4 9	1
Salop ...	Bridgnorth	2 0 0	2 2 0	11 14 9	2
Westmorland	Kirkby Stephen	10 0	6 0	7 4 6	1
		34 10 0	11 10 0	230 13 1	18

* Dismissed under Probation of Offenders Act.

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Cheshire.—Miss E. L. Coleman, N.D.D., has been appointed Assistant Dairy Instructor, *vice* Miss M. Jones, N.D.D.

Mr. P. H. Brown has been appointed Assistant Lecturer in Horticulture, *vice* Mr. E. Skillman, B.Sc.

Kent.—Mr. W. W. Glaister, M.Sc., has been appointed Agricultural Lecturer and Warden of the Farm Institute, *vice* Mr. E. A. Bartlett, N.D.A.

Norfolk.—Mr. D. H. Findlay, B.Sc., has been appointed Senior Agricultural Advisory Officer (West Norfolk), *vice* Mr. G. H. Bates, B.Sc.

Mr. J. H. Cock, B.Sc., N.D.A., N.D.D., has been appointed Agricultural Advisory Officer (East Norfolk).

Mr. E. T. Sykes, M.A., has been appointed Agricultural Advisory Officer (West Norfolk).

Mr. E. Skillman, B.Sc., has been appointed Intensive Horticultural Instructor.

Mr. R. J. Gutsell, N.D.H., has been appointed Horticultural Instructor (East Norfolk), *vice* Mr. P. E. Cross, N.D.H.

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Mr. G. F. Wheeler, N.D.H., has been appointed Horticultural Instructor (North-west Norfolk).

Northumberland.—**Mr. W. D. Carson, N.D.A., N.D.D.,** has been appointed Assistant Organizer of Agricultural Education, *vice* Mr. O. J. Pattison, M.Sc.(Agric.), N.D.A.

Somersetshire.—**Mr. A. T. G. Trew, N.D.A., N.D.D.,** has been appointed Assistant Agricultural Organizer.

Some Wireless Talks to Farmers in May

<i>May</i>	<i>Station</i>	<i>Time</i>	<i>Speaker</i>	<i>Subject</i>
1, 8, 15, 22, 29)	National	6.45 p.m.	Professor J. A. Scott Watson	Topics of the moment
3, 17, 31)	Scottish	7.20 p.m. (not fixed)	Mr. A. D. Buchanan Smith	For Scottish Farmers in particular
9	"	6.30 p.m.	Mr. R. L. Scarlett	Prospects of Market Gardening
25	"	6.30 p.m.	Mr. A. D. Imper	Farm Economy
2, 16	Midland	6.30 p.m.	Mr. W. B. Thompson	For Midland Farmers
2	Western	7.55 p.m.	Mr. A. G. Street	Yeoman's English: The Voice of Wiltshire
3	"	9.25 p.m.	A Rural Interlude devised by Mr. Eldred Walker	The Wool Rake or Sheep Shearing Sixty Years Ago
9	"	6.30 p.m.	A discussion between Mr. A. W. Ling and Mr. G. H. Purvis	Cocks and Hens
23	"	6.30 p.m.	Mr. J. A. Garton	The Show's the thing. A forecast of the Bath and West Show at Taunton
31	"	6.30 p.m.	Special Talk from the Bath and West Show Ground	Points of Interest in the Show
31	N. Ireland	(Time not fixed)	Mr. Peter Fitzpatrick	Farmer's Work and Worry

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Investigations into the Problem of Milk with a Low Content of Solids-not-Fat. By M. N. Nicholson, B.Sc., and G. E. Lesser, N.D.A., N.D.D. Bulletin No. XLVI. (University of Reading, Department of Agriculture. 1934.)

This is a useful report because it brings together details of opinions previously held and fresh records of investigations designed to evolve a practical solution to the problem of low solids-not-fat. In addition to descriptive matter, the data obtained have been carefully analysed, and it is regrettable that much more work is necessary before a definite solution to the problem is found.

The present investigations cover a period of three years in the case of one herd and shorter periods with two other herds, the first herd being known as consistently producing milk falling below the presum-

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tive legal standard of 8.5 per cent. of solids-not-fat. Practically all the cattle were of a good breed and under good general management.

The programme formulated by the Advisory Committee fell into three sections:—

- (i) The extent to which the herd was giving milk below the presumptive legal standard when fed on a properly balanced ration;
- (ii) To ascertain the cause or causes for the low content of solids-not-fat; and
- (iii) The possibility of the problem being a nutritional one—by feeding to groups of cows special feeding stuffs most of which are not ordinarily used by the dairy farmer, and ascertaining by means of weekly analyses of milk samples from individual cows, if any improvement in the general level of solids-not-fat could be brought about.

Information obtained from several sources during the course of these investigations indicated that milk with a low content of solids-not-fat is much more widespread than is commonly believed. It was found that 64 per cent. of 4,837 samples were deficient in solids-not-fat. No definitely useful solution was found to Section (ii). In regard to Section (iii) changes in diet (introducing green foods or materials supplying vitamins or minerals) did not alter the low content of solids-not-fat.

The conclusions, generally, may be said to endorse the wisdom of the provisions of an "appeal to the cow" in cases of suspected adulteration, until a definite solution to the problem is evolved. It is suggested that a wider knowledge of the actual mechanism of milk secretion and the effects of various pathological conditions, may, in conjunction with the data now available, prove of value to other workers in the same field.

Gardening in East Africa. By Members of the Kenya Horticultural Society and of the Kenya and Uganda Civil Services. Ed. by A. J. Jex-Blake, M.D., F.R.C.P. Introd. by Sir Arthur Hill, K.C.M.G., F.R.S. Pp. xiv + 330; vi plates and 6 figures. (London: Longmans, Green & Co. 1934. Price 12s. 6d. net.)

East African horticulturists have set a commendable example to the world by producing this excellent volume, for a series of surveys describing horticultural technique under special conditions in different parts of the world, would be a valuable contribution to knowledge. In this work it is gratifying to note the collaboration of Government scientific officers—chemist, entomologist, meteorologist and mycologist—with amateur gardeners, and this forms a challenge to private gardeners in Britain. For anyone engaging in horticulture in East Africa, here is a book that provides a wealth of essential local knowledge, written in a style that may fire its readers with enthusiasm. Gardeners in other countries will be interested as well, for the behaviour of common plants under special conditions may frequently contain a useful cultural hint.

Plain Poultry Science. By F. Bowers. Pp. ix + 118, and 17 plates. (London: Purpose Publishing Co., 3 & 5, Norwich Street, Fetter Lane, E.C.4. 1934. Price 3s.)

The author has had a long experience of the poultry industry, first as a commercial egg farmer and pedigree breeder, then as a poultry instructor on the staff of the East Anglian Institute of Agriculture. Since resigning this position six years ago, he has devoted his energies to the hatchery business, and is at present proprietor of an extensive plant in Essex.

At the outset he is careful to explain for the benefit of those who may contemplate poultry-keeping as a full-time occupation, that the industry tends towards specialization, and requires both unremitting energy and a fair amount of capital, in addition to a certain knowledge of the particular branch of poultry-keeping that it is proposed to adopt.

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The treatment of the subject is unbalanced in places. Thus, while such matters as chick rearing, culling and feeding are ably discussed from a practical point of view, an important subject like the various breeds and their characteristics is dismissed in four pages. The closing chapters deal with diseases, remedies and methods of conducting post-mortem examinations. Questions of disease are usually better left to the qualified poultry pathologist, and in any case the author's treatment of the subject is too brief to be adequate. Apart from these criticisms, Mr. Bowers' book contains many practical hints that should help the intending poultry farmer to avoid some of the numerous pitfalls that await him at the commencement of his career.

Scientific Horticulture. Volume III. Ed. R. T. Pearl, B.Sc., A.R.C.S., D.I.C. Pp. 226. (Published by the Horticultural Education Association. Obtainable from the Editor, South-Eastern Agricultural College, Wye, Kent. 1935. Price 3s. 6d.)

The old title of "Horticultural Education Association Year Book" of previous volumes failed to indicate the aim of the Association, which is properly conveyed by the new title, "Scientific Horticulture," given to the present volume. The book contains a collection of papers on special branches of horticulture, all written by recognized experts in their own particular field; many of the papers were given as lectures at the Revision Course in Horticulture held during the summer at the University of Reading. These are concerned mainly with the production of vegetable crops grown in the open and under glass, and with bulbs. Articles of interest to the fruit grower are also included, and this annual is a valuable book that should be widely read.

The Practical Fruiterer and Florist. Edited by W. B. Shearn, F.R.H.S., and W. A. Jeffs, F.R.H.S. 3 vols. Pp. 256 + 256 + 256. Illus. (London: George Newnes, Ltd. 1935. Price £2 2s. 6d.)

Although the retail fruit trade has been supplied for many years with technical periodicals, it has not yet had the benefit of a comprehensive and authoritative treatise covering the entire field of the retailer's operations. The present work is fully authoritative because, although the editors themselves possess first-hand knowledge of the subject, they have wisely secured the co-operation of over forty nationally-recognized specialists, each of whom has contributed the best of his knowledge.

The comprehensive character of these handsome quarto volumes is noteworthy, and it would appear that scarcely a detail concerned with the retail service of fruit, flowers, vegetables and bulbs has been overlooked. Yet the treatment is commendably brief.

An extensive section is devoted to a descriptive list of the fruits, flowers and vegetables supplied to the public, giving information as to season, qualities and use in connexion with each. It will doubtless be news to many readers of this JOURNAL that 50 kinds of fruits and nearly 200 varieties of flowers and flowering plants are available to the public.

Methods of grading and packing, and types of packages used, are dealt with fully. Points to watch in purchasing, and the preparation of produce for display and sale, are treated in detail. Succeeding sections cover transport, salesmanship, shop equipment, business management, book-keeping and accounts, advertising and display, and the work closes with a clear explanation of the numerous Acts and Orders that affect retailers. As a good many fruit and vegetable retailers also deal in eggs and poultry, there is an informative section covering these products.

Each branch of the subject is profusely illustrated with photographs and line drawings, supplemented by twelve coloured plates.

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It is difficult to visualize any retailer who could not profit by a perusal of this compendium of expert opinion and instruction. The work indicates clearly the relation of the home grower to the industry as a whole, and demonstrates that the retail distributor's problems and complications are not less arduous than those of the producer.

Reshaping Agriculture. By O. W. Willcox, Ph.D. Pp. 157. (New York: W. W. Norton & Co., Inc. 1934. Price 7s. 6d.)

This work is an attempt to set within a framework of classical economic theory the results of the advances in farming technique that have been made in the past hundred and fifty years. Dr. Willcox has covered the field completely. He has discussed the development of manurial science, the effect of the work of the plant breeders and pathologists, and the new inventions that engineering has placed at the disposal of the farmer.

The author has necessarily adopted great simplification in his argument in order to make his case to the urban and lay population, and for this reason specialists may take some small measure of exception to the validity of some statements. For instance, the imaginary experiment set out on pages 28 and 29 may contain the essential illustration that Dr. Willcox intended, but few soil scientists would accept the conclusion that "if (a single year's) experiment has been properly conducted we shall have a set of characteristic results that is always encountered in all normal operations in the culture of all plants anywhere."

Aside from such details, however, Dr. Willcox demonstrates, what has been fully realized by those within the industry, that the progress made in a comparatively brief period has placed at the disposal of the farmer powers that it was impossible to envisage only a few years ago. The result is that a small percentage of the former number of persons engaged in agriculture can now provide the world requirements. If, therefore, any degree of economic security is to be provided for existing farmers, drastic measures will have to be taken and the industry will have to submit to external control or to set up its own internal organization for control. Dr. Willcox is convinced that the best measures are along the lines of the organization set up, by those engaged in it, for the control of the Queensland cane sugar industry and the British Milk Marketing Board.

The whole book is a demonstration of the impossibility of controlling the measure of production by area reductions as is proposed in the United States, and of the advantages of adopting a method of market control as a means of reconstructing agriculture. In his last chapter the author effectively disposes of the bogey of monopoly, which is so very present in the minds of the opponents of such measures.

Aspects of Land Grant College Education. By P. O. Johnson. Pp. xi + 271. (Oxford University Press. Minneapolis: University of Minnesota Press. 1934. Price 11s. 6d.)

A large number of data concerning land grant colleges and universities in the United States of America are here assembled in a form that permits of easy comparison between the policies and records of the various institutions. The opening chapters include a comparative study of the fiscal policies of five large universities, viz., California, Illinois, Minnesota, Ohio and Wisconsin. The author then proceeds to an analysis of the libraries of fourteen comparable establishments. One chapter is devoted to the faculty personnel of Minnesota University, and the remainder of the volume deals with students, their migrations from their home states, the various types of educational institutions that they enter, their social and economic characteristics and educational history. The book will be of interest to students of conditions affecting agricultural education in America, and will appeal to those who have to deal with somewhat dissimilar but related problems in this country.

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NOTES FOR THE MONTH

Jubilee Window Boxes ; A Successful Scheme

THE Silver Jubilee looks like bequeathing a permanent legacy of beauty to London. So successful has been the scheme of window-box decoration, originated by the Ministry in co-operation with the British flower industry, and warmly sponsored by H.M. Office of Works, that plans are already on foot to secure that, wherever practicable, the boxes shall be retained and kept filled with flowers as a lasting memento of the Jubilee.

On the Government buildings in Whitehall, the maintenance of window boxes for more than a limited period presents special difficulties; and here, with the exception of Downing Street, where the display of ornamental foliage will remain throughout the summer, the flowers will disappear when the decorations as a whole are removed. Elsewhere, however, the same difficulties do not obtain, and it is expected that many organizations that have adopted the window-box scheme of decoration will feel encouraged by its success to continue it.

London owed no little of the gaiety and charm of its appearance during the sunny days of Jubilee Week to the miniature gardens that blossomed so miraculously and transformed some of its most famous buildings and thoroughfares into oases of colour and brightness. Jubilee window boxes, however, have by no means been limited to Whitehall or the West End. They have been an effective form of decoration all over London. Kensington, Marylebone and Paddington, Battersea and Bethnal Green followed the lead of Westminster; while in other towns also—and even the country—

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side—window boxes have appeared here and there to challenge the supremacy of flags and garlands.

The window-box decorations in London owe much of their success to the generosity of the flower industry. The decision of the growers to combine with the florists in making a handsome gift of plants and boxes to the Government for the purpose of decorating a Government building in Whitehall was the start of the scheme, and this led to considerable developments elsewhere. The building chosen to be decorated by the industry was the Ministry of Health and Board of Education Offices at the corner of Whitehall and Parliament Square. Here the provision of plants and boxes and the entire scheme of decoration were undertaken by the flower industry, the cost of the gift being met from a fund subscribed by growers, wholesalers and retailers all over the country. The flowers selected were pink hydrangeas and pink rhododendrons flanked by dwarf trimmed box trees. The boxes were edged with trailing sprengeri. The industry also undertook the decoration of Downing Street.

Further Government buildings were officially decorated with growing flowers, to designs approved by H.M. Office of Works. Amongst them were the Air Ministry (Gwydyr House), the Admiralty, the Home Office and Richmond Terrace. At the Air Ministry the scheme was all blue and was carried out with blue hydrangeas. The Adam screen at the Admiralty was decorated with yellow azaleas and yellow genistas. At the Home Office red rhododendrons were used, and at Richmond Terrace the chosen flowers were again rhododendrons.

All the arrangements for the floral decorations of Government buildings were carried through by a special committee representative of the Ministry of Agriculture, the Office of Works and the flower industry.

An interesting experiment was made in the forecourt of Buckingham Palace. Here a hedge of beautifully matched conifers was erected along the entire length of the railings. The hedge was specially designed to screen from view the apparatus used for floodlighting the facade of the Palace. All the trees were grown in this country and were a Jubilee gift from British nurserymen.

The Regent Street Association was responsible for the organization of a spectacular scheme of window-box decoration in its famous thoroughfare. Here a practically un-

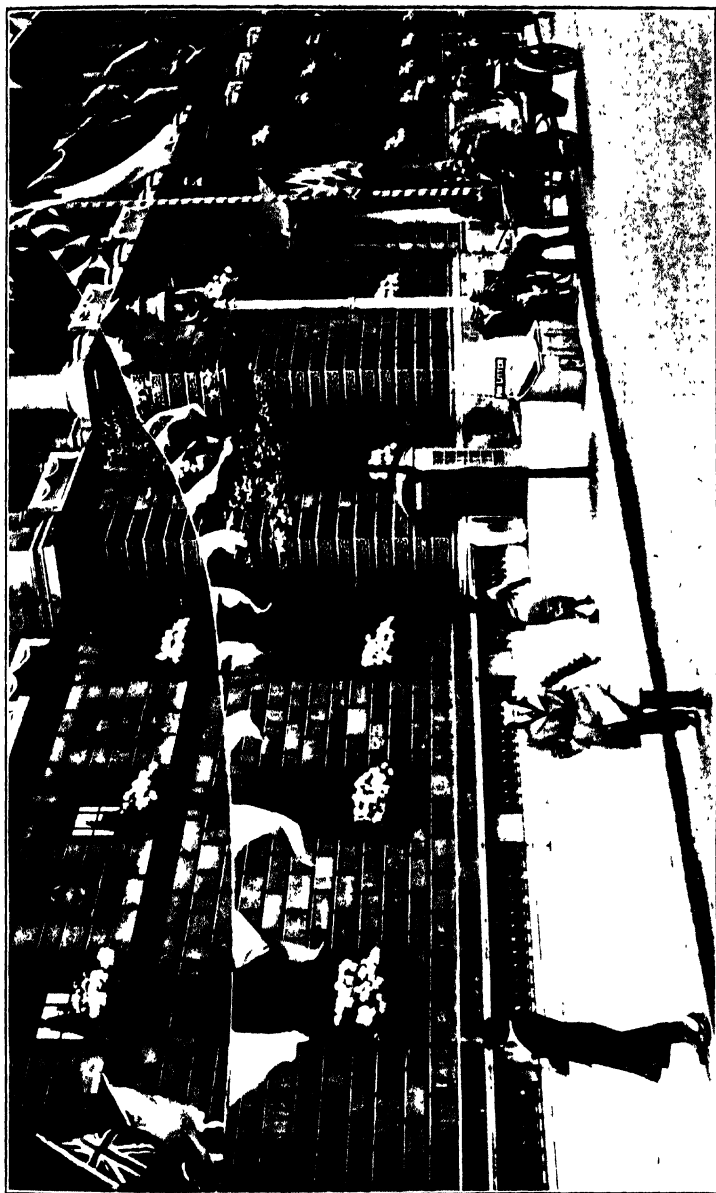


Photo : Topical Press
The Silver Jubilee. Window box decoration at the Ministry of Health and the Board of Education.
Pink rhododendrons and pink hydrangeas



Photo · Topical Press

The Silver Jubilee Window box decoration at Gwydyr House, Whitehall.
Blue hydrangeas.

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broken line of window boxes, massed with a profusion of flowering plants, ran the length of the street on both sides from top to bottom. The colour scheme was red, white and blue, and blue and red cinerarias and white marguerites with pink and blue hydrangeas were used with great effect. One or two firms chose all-white schemes, and these were carried out in white marguerites. At the Carlton Hotel in the Haymarket, red, white and blue flowers were again used and the balconies were backed with bay trees. Many clubs and hotels in Piccadilly, St. James's Street, and Pall Mall, as well as shops in Oxford Street, arranged outstanding displays on similar lines.

It is a tribute to the success of the Jubilee window boxes that they have disputed with flood-lighting for first place in popularity as a mode of decoration. *The Manchester Guardian* compared the two in a leading article, and honours seem almost to go to the window boxes. It is observed that: "Of all the decorations for the sunny hours, probably most people found that the flowers and window boxes, where they were used, were the most charming." In combination, the two are irresistible, as anyone will be able to judge who takes an evening stroll up Regent Street where flowers and flood-lighting will be maintained the summer through.

The Jubilee window-box scheme has been a notable stimulus to the pot plant industry. For several days preceding the Silver Jubilee the demand for the kinds of pot plants most suitable for window-box decorations was so great that by Jubilee Eve they were almost unprocurable.

Sampling Observations on Wheat, 1934-35: Report for Second Quarter

THE observations for the present quarter, January to March, cover the earlier part of the period of shoot formation by the plant. The summary presented in the table below shows the date of tillering (which is defined conventionally as the moment when the number of shoots is double the number of plants), the rate of tillering at tillering date in tillers per 100 plants per week, and the plant number at tillering date. The last figure, by comparison with the corresponding figure in the report for the first quarter, gives a measure of the amount of plant elimination that has taken place.

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While there were some sharp cold spells, the past winter as a whole has been the mildest in this country for several years. As a consequence, the early development of the plants, commented on in last quarter's summary,* continues to be the most noteworthy feature of the season's observations. The date of tillering was passed by February 21 in sixteen out of the twenty-four plots on which observations were made, whereas in the two previous years shoot formation did not proceed rapidly in the majority of cases until the middle of March. Seale-Hayne has been the first station to reach tillering date in all three years, the mean dates at this station for the two standard varieties, Square Head's Master and Yeoman, being December 27 in 1932-33, February 1 in 1933-34 and December 11 in 1934-35.

As a result of the early development of the plant, tillering has been more subject to check this year by sudden spells of cold weather. This effect shows itself in the marked differences between tillering dates for the different varieties at stations that tillered early, and in low rates of tillering generally. At Seale-Hayne, the third variety, Garton's No. 60, did not tiller until January 30, seven weeks after the standard varieties, and at Long Sutton there was practically a month's difference between each pair of the three tillering dates. It will be noticed, however, that for the three stations, Wye, Plumpton, and Boghall, at which the plants tillered in March, the differences in date between Square Head's Master and Yeoman were quite small. This confirms the impression gained in previous years that unless favourable weather produces early tillering, shoot formation normally becomes rapid about the middle of March.

Yeoman tillered significantly earlier than Square Head's Master at six stations out of ten, and possibly also at Newport, at which the date was not accurately determined. The differences in date were in several instances so large that the calculation of a standard error was unnecessary. The only case in which Square Head's Master was significantly earlier occurred at Wye. At each of the four stations that grew a third variety, it was considerably later than the standard varieties in reaching tillering date.

Rates of tillering were unusually low, even at stations where tillering occurred in March. At Seale-Hayne and Boghall the rate was significantly higher for Square Head's

* This JOURNAL, March, 1935, p. 1152.

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SAMPLING OBSERVATIONS ON WHEAT, 1934-35 FIRST QUARTER.

Station	Variety	Tillering				
		Date	Standard error of difference	Rate Tillers per 100 plants per week	Standard error of difference	Density (Plant number per 32 metres)
LONG SUTTON Hampshire	S.H.M.*	Feb. 3.20	—	9.4	—	1,324
	Yeoman	Jan. 3.01	—	11.4	—	1,572
	Wilhelmina	Mar. 3.82	—	18.7	—	874
SEALE-HAYNE Devonshire	S.H.M.	Dec. 11.85	±0.927(1)	37.8	±2.53(1)	1,739
	Yeoman	Dec. 9.96		30.5		2,168
	Garton's No. 60	Jan. 30.32	—	3.0	—	1,310
WYE(2) Kent	S.H.M.	Mar. 18.43	±1.18	14.2	±1.86	1,367
	Yeoman	Mar. 21.25		17.1		1,469
ROTHAMSTED Hertfordshire	S.H.M.	Feb. 20.69	—	35.1	—	2,100
	Yeoman	Feb. 9.84	—	29.5	—	2,562
	Victor	Mar. 2.30	—	28.1	—	2,209
PLUMPTON Sussex	S.H.M.	Mar. 16.24	±0.939	21.0	±2.52	749
	Yeoman	Mar. 14.09		21.7		939
CIRENCESTER Gloucestershire	S.H.M.	Feb. 2.14(3)	—	25.8	—	757
	Yeoman	Before Jan. 28	—	—	—	969(4)
NEWPORT Shropshire	S.H.M.	Before Feb. 4	—	—	—	973(5)
	Yeoman	Before Feb. 4	—	—	—	1,147(5)
WOBBURN Bedfordshire	S.H.M.	Feb. 5.54	±1.74(1)	22.8	±2.99(1)	1,022
	Yeoman	Feb. 3.47		22.3		1,216
	Victor	Feb. 19.72	—	35.5	—	1,303
SPROWSTON Norfolk	S.H.M.	Feb. 7.58	±0.926(1)	27.0	±3.08	1,351
	Yeoman	Jan. 31.59		28.6		1,678
BOGHALL Edinburgh	S.H.M.	Mar. 12.37	±0.404	41.5	±0.959	1,957
	Yeoman	Mar. 12.46		37.0		1,732

* Square Head's Master.

- (1) Applicable to Square Head's Master and Yeoman only.
- (2) Based on 32 three-quarter-metre samples at each set of observations.
- (3) Tillering calculated from two sets of observations only.
- (4) On January 28.
- (5) On February 4.

Master than for Yeoman, but in general the differences between the rates for the standard varieties were small. The highest rates occurred at stations with high plant numbers.

NOTES FOR THE MONTH

The apparent plant elimination was higher this year than in the two previous years, a loss of over 30 per cent. being recorded for both standard varieties at Long Sutton, Wye and Plumpton. Where there was a difference, the percentage loss was generally slightly less for Square Head's Master. The rate of decrease of plant number does not appear to be greater during tillering than before, and is probably governed mainly by the weather. In view of the general mildness of the winter, plant elimination might have been expected to be low. Temperatures have, however, been unusually variable within short periods, and cold spells were fairly frequent.

At several stations the observers have added their comments on the progress of the plants and on the weather between the dates of observations. These have proved very helpful in interpreting the data, and it is hoped that this practice will spread.

Register of Dairy Cattle

VOLUME XVIII of the Register of Dairy Cattle has just been published. It contains particulars of 606 cows in respect of which Certificates of Merit have been awarded by the Ministry since October 1, 1934, as compared with 680 cows entered in the previous volume. To be eligible for a Certificate of Merit, a cow must have given, during a period of three consecutive Milk Recording Years, not less than the prescribed yield of milk, and must normally have calved not less than three times during those years. The prescribed yields for the three-year periods are 30,000 lb. for Friesians; 27,000 lb. for Ayrshires, Blue Albions, Lincoln Red Shorthorns, Red Polls and Shorthorns; 24,000 lb. for all other breeds or types except Dexters; and 21,000 lb. for Dexters.

The Register contains a statement showing the number and distribution of the yields of the cows of the various breeds entered, and the highest yield certified for each breed for the three years ended October 1, 1934. Of these cows, 10 gave over 50,000 lb. of milk during the three years concerned; 44 over 40,000 and under 50,000 lb.; 74 over 35,000 and under 40,000 lb.; 193 between 30,000 and 35,000 lb.; 172 between 27,000 and 30,000; 66 between 24,000 and 27,000 lb.; and 3 between 21,000 and 24,000 lb.

Particulars are also given of pedigree bulls of proved milking strain. The condition of entry of a bull in the Register is that its dam and sire's dam have given the

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standard yield prescribed for their breed or type in any particular Milk Recording Year. Entries relating to 19 bulls are given in the volume.

A list of the Milk Recording Societies of England and Wales, with particulars of each Society and the name and address of its Secretary, is included in the Register.

Dairy farmers and others desirous of acquiring high-yielding, milk-recorded cows that have been regular breeders should find the Register a valuable book of reference.

The Register is priced 1s. net and can be obtained from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or through any bookseller. A copy of the volume is issued free to all members of Milk Recording Societies.

Pests and Diseases of the Sugar-Beet

WHEN a new crop is introduced into a country, it frequently happens that for a number of years growers enjoy the benefits of its relative freedom from pests and diseases; and this is practically the state of affairs with sugar-beet growing in England to-day. There are, however, already some signs that troubles are not far off, and it would be folly to be heedless of them.

On the Continent, sugar-beet has been grown for nearly a century, and many pests and diseases have already appeared in the crop, several of them having become so serious a handicap that much intensive research work has been necessary in an endeavour to find methods of control.

At the instigation of the Sugar-Beet Research and Education Committee, Messrs. F. R. Petherbridge, M.A., and H. H. Stirrup, M.Sc., have made a special study of the Continental literature on this subject, and have undertaken a tour of the chief sugar-beet growing areas of the Continent, where they discussed the problems with the leading scientific workers. A report of the investigation has now been published as one of the Ministry's Bulletins.* and presents a full account of present-day knowledge of sugar-beet pests and diseases.

The old adage that "Prevention is better than cure" holds good with the ills that affect crops, but crops can to a large extent be maintained in a healthy state if they are grown in such a way as to avoid the establishment of environmental conditions that favour attacks of disease.

* Bulletin No. 93, *Pests and Diseases of the Sugar-Beet*. Obtainable through a bookseller or from H.M. Stationery Office. Price 1s. 6d. (by post 1s. 8d.).

NOTES FOR THE MONTH

The information given in this Bulletin is supplemented by numerous illustrations. The publication not only assists growers in the recognition of various pests and diseases, but provides advice on the methods most likely to be effective in dealing with them.

A Method of Sowing Turnip Seed

THE following note has been communicated by Mr. John Woodhouse, "Waverley," Aikrigg Avenue, Kendal:—

Over twenty years' experience of a method of sowing turnip seed, described below, proved it to be a cheap and effective means of minimizing damage to newly-sown turnip seed through the attacks of Turnip Fly and birds.

It is usual to sow about 3 lb. of seed per acre; and, with this method, a farmer, intending to sow, say, four acres, should place 6 lb. of the seed in a close-woven bag, immersing the bag in a bowl of water for 12 to 14 hours in order to swell the seed. When taken out, the bag should be hung up to allow the surplus water to drain away; and the seed will be ready for use when it ceases to adhere to the fingers if stirred with the hand. Care should be taken to keep the bag in a free current of air to prevent the seed germinating before it can be used. By particular attention to this point, the steeped seed can be kept for as long as six or seven days without detriment, should the weather be unfavourable for sowing; but, in such event, the seed must be shaken up about three times a day, during daylight hours, until the time of sowing.

The essential feature of the method is to sow a mixture of equal parts of steeped and dry seed, always keeping the respective sorts in separate bags until the time of sowing. Equal quantities should be measured into the drill seed box; and, before putting into working gear, the brushes or cups should be turned backwards a number of times to ensure that the steeped and dry seed become thoroughly mixed. It will be found that slightly less than 2½ lb. of the mixture will suffice to sow an acre.

When sown, the steeped seed will germinate in from four to six days; and the dry seed in from ten to fourteen days, according to the weather. With turnip seed sown in this manner, the subsequent operation of singling is made much easier and quicker, there being only half the number of plants to single. The earlier plants, from the steeped seed, might be destroyed by Turnip Fly in places, but a strip

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a yard or so long has usually been the extent of such damage; but the plants from the dry seed, germinating later, fill up the places damaged, and may be expected to be in rough leaf by the time the plants from the steeped seed have grown large enough for hoeing and singling. Where the steeped seed escapes destruction, the plants would be strong enough to smother those from the dry seed germinating later. Thus, by sowing in this manner, the crop has two chances of making good. In a lengthy experience of the method mentioned, there has never been a crop failure, nor any necessity for a second sowing.

Outbreak of Laryngo-Tracheitis (Contagious Bronchitis) in Poultry in England

1. THE Ministry has received reports of the existence of Contagious Bronchitis among poultry in flocks in various parts of the country. The identification of the disease on premises in Norfolk, Middlesex, East Sussex, Warwickshire and Derbyshire has been confirmed at the Ministry's Veterinary Laboratory.

2. This disease affects the common fowl at all ages, but is not transmissible to human beings, or to other species of domesticated poultry, which, with the possible exception of the turkey, are not susceptible.

3. It appears that in some of the outbreaks the mortality has been considerable.

4. Inquiries made by the Ministry suggest that the disease has existed in this country for some time, and that its distribution has taken place largely through disposal of birds in markets.

5. The Ministry recommends that the following steps should be adopted to protect healthy flocks against the risk of introduction of this disease by newly purchased birds:—

- (a) For the time being, special care should be exercised in the introduction of live birds to poultry farms.
- (b) Every newly purchased lot of birds should be strictly isolated and specially supervised for 21 days.
- (c) In the event of unusual mortality among birds on a poultry farm, the owner should take immediate steps to ascertain the cause.

6. For purposes of diagnosis, one or two recently-dead birds should be despatched to a laboratory and, if Contagious Bronchitis is diagnosed, the owner should be guided

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by the advice given by the laboratory as to the measures to be taken for the control of the disease. If an owner is in doubt where to send dead birds for diagnosis, he should consult the County Poultry Instructor.

7. A leaflet on Laryngo-Tracheitis (Contagious Bronchitis of Fowls) has been issued by the Ministry, and a copy will be sent post free on application to: The Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Agricultural Congresses in Connexion with the International Exhibition at Brussels, 1935

THE Ministry is informed that several congresses concerned with different aspects of agriculture and rural life will be held next month (July) in connexion with the International Exhibition at Brussels. These include:—

A Congress of Rural Cinematography (July 23-27).—This congress will consider the use of the cinema as a means of education and propaganda for the improvement of rural life and conditions.

First International Congress of the Agricultural Press (July 26 and 27).—At this congress, representatives of the world's agricultural papers will meet to consider conditions of employment for journalists, travelling facilities and other advantages accorded to them, and the organization of libraries for their use.

The Fifth International Congress for the Improvement of Rural Life (July 24 and 25). This congress will discuss methods of counteracting the rural exodus; agricultural unemployment; the extension of small holdings by private initiative and by State intervention; and the promotion of peasant arts.

Particulars of the above congresses may be obtained on application to the Secretary, Mr. J. Giele, 40, Rue des Joyeuses Entrées, Louvain, Belgium. Another congress to be held during July is

The Fourth International Technical and Chemical Congress of Agricultural Industries (July 15-28).—The following sections of agricultural interest have been arranged at this meeting: Selection of Plants and other Raw Materials of the Foodstuff Industries; Agrology; Fertilizers; Diseases and Pests of Industrial Plants; Cultivation of Industrial Plants; Cultivation of Tropical Industrial Plants; and Beet and Cane Sugar Manufacture. Particulars of this last con-

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gress may be obtained on application to the General Secretary, 133, Chaussée de Charleroi, Brussels, Belgium.

It will be noted that all these congresses are being held during the latter half of July, and can, therefore, be covered by a fortnight's stay in the Belgian capital, where the great Exhibition, covering 250 acres of ground in very beautiful surroundings, will be open until the autumn.

National Diploma in Agriculture and the Fream Memorial Prize, 1935

THE Thirty-sixth Annual Examination for the National Diploma in Agriculture was held, under the auspices of the National Agricultural Examination Board, at the University of Leeds from April 9 to 16, 1935, when 133 candidates presented themselves. Of these, 9 candidates took the whole examination; 61, who had already passed in certain subjects, appeared to take the remainder; and the other 63 came up for a first group of subjects. Of this last group, 41 (including 1 woman) passed, and are, therefore, eligible to take the remaining subjects in either 1936 or 1937.

Of the 70 candidates sitting for the Diploma, 49 (including 2 women) were successful, but none attained to the Honours standard. The training colleges of the successful candidates were as follows:—

	<i>Diploma.</i>	<i>First group of subjects.</i>
<i>England:</i>		
Armstrong College, Newcastle-upon-Tyne ..	3	5
East Anglian Institute of Agriculture, Chelmsford	1	3
Harper Adams Agricultural College, Newport, Salop	1	3
Leeds University	6	1
Midland Agricultural College, Sutton Bonington	4	4
Reading University	1	3
Royal Agricultural College, Cirencester ..	—	2
Seale-Hayne Agricultural College, Newton Abbot	7	—
South-Eastern Agricultural College, Wye, Kent	6	4
Non-Collegiate	2	—
<i>Wales:</i>		
University College of Wales, Aberystwyth	3	1
<i>Scotland:</i>		
East of Scotland College of Agriculture, Edinburgh	1	2
Glasgow University and West of Scotland Agricultural College, Glasgow	7	8
West of Scotland Agricultural College, Glasgow	7	5
	49	41
		219

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The Fream Memorial Prize, awarded to the candidate obtaining the highest marks in the examination, was secured by Mr. C. Kingsley, of the East Anglian Institute of Agriculture, Chelmsford. The prize, of an approximate value, this year, of £7, is provided from a fund entrusted to the Ministry as a memorial to the late Dr. Fream; and is applied to the purchase of books selected by the recipient as best calculated to assist him in pursuing his agricultural studies.

Importation of Cherries in 1935

With the object of preventing the introduction of the Cherry Fruit Fly, the Minister of Agriculture and Fisheries has made an Order under the Destructive Insects and Pests Acts, 1877 to 1927, regulating the importation of cherries into England and Wales during the 1935 season.

From May 28, the importation of cherries grown in *Spain* and *France* has been prohibited, with the exception of French cherries grown within a small district around Honfleur. Details of this district are given in the Order. Cherries grown in *Italy* will be admitted until June 12, if accompanied by a certificate of origin. After that date only those grown in the Region of Emilia will be allowed to enter; after June 23, the importation of cherries grown in any part of Italy will be entirely prohibited.

Cherries grown in *Germany* will be admitted until June 26 if accompanied by a certificate of origin; after that date no German cherries will be admitted except those certified not to have been grown south of latitude 53° N. or in East Prussia. Certificates of origin must accompany cherries grown in any other European country.

Copies of the Order may be obtained from His Majesty's Stationery Office, price 1d. net.

A REVIEW OF THE PROGRESS OF ELECTRIFICATION IN MODERN ENGLISH FARM PRACTICE

H. J. DENHAM, M.A., D.Sc.,

*Director of the Institute for Research in Agricultural
Engineering, University of Oxford.*

IT is the purpose of this article to deal on broad, and somewhat generalized lines, with the present applications of electricity that are proving of practical use to farmers, and with the limitations and restrictions on the use of electricity that the rural supply engineer may expect to find quoted as impeding the adoption of its advantages.

One of the first difficulties with which the investigator has to contend is the absence of any reliable statistics of the number of farms connected to the mains, and the total consumption in kWh of these farms. A figure of 4,000 was quoted some years ago by Mr. Borlase Matthews—this out of a total of perhaps 470,000 farms—but judging by the rapid expansion in many rural areas, this must by now have been considerably exceeded.

An important feature of the last few years has been the creation of "demonstration" areas at Bedford and Norwich. The object of these areas was to demonstrate what could be effected by careful planning, competently and economically carried out in a rural area of average type without any specially favourable conditions for remunerative development, under a guarantee from the Development Fund covering 75 per cent. of the risk of financial loss involved.

The Bedford Scheme has now been in operation for over four years, the Norwich area for rather less, and neither area is yet on a profitable basis, although there are ample grounds for hoping that both will be so within the projected period of ten years for the experiment.

In neither area is the number of farms connected very large. In the Bedford area the latest available figures give 194 farms out of a total of 3,794 consumers, as compared with 26 farms out of 1,124 consumers at the inception of the scheme in 1930. In the Norwich area the corresponding figures are 135 farms out of 1,793 consumers, as against 2 out of 196 in 1931.

ELECTRIFICATION IN ENGLISH FARMING

An investigation of the Bedford area from a purely farming point of view was undertaken at the request of the Electricity Commissioners in 1933 by two members of the staff of the Institute for Research in Agricultural Engineering, and the conclusion was reached that the present use of electricity by agriculturists within the area was quite as much as might have been expected, if not more, having regard to the time that the supply has been available. It was pointed out, however, that the Bedford area is self-supporting as regards milk production and does not export milk, hence the expansion in the use of electricity which this particularly progressive section of farming is causing in other parts of the country could not be counted on in this area.

There are three other important rural areas for which fairly full figures are obtainable: Aylesbury, with a total of 175 farms out of 6,030 consumers; Chester, with 393 farms and agricultural holdings out of 2,980 consumers; and Colchester, with 35 out of 6,215 consumers.

The most common source of power on general, and indeed on many specialized farms, is the internal combustion engined tractor, which in the forms available to-day is an extremely efficient and trouble-free machine. Under actual conditions of farming, with many days in the year in which it is not possible to use the tractor or the farm staff on the land, it is convenient to bring in the tractor and to use it and the available labour to work with the stationary machines in the farm yard, for threshing, grinding and the like operations. In the more specialized forms of farming, such as dairy farming, this is not, of course, possible, and some form of stationary or semi-portable engine is used, with paraffin or heavy oil as fuel.

It is not easy to compare on general grounds the electric motor with the tractor for these casual operations of the farm, on any really satisfactory basis, since the question of the allocation of capital charges is almost impossible of solution for more than individual instances. Actually a long experiment on these lines is in progress at the Rothamsted Experimental Station to compare the advantages of the two forms of power for the routine grinding of farm food-stuffs, and careful figures of times—including the time spent in lining up and starting—and costs are being secured. The comparison of stationary or permanent sources of power is simpler. Here in practice the domi-

ELECTRIFICATION IN ENGLISH FARMING

nating factor is the number of hours in the year for which the power will be required. Where the hours are few the electric motor, given a reasonable charge per unit, is cheaper than the internal combustion engine, by reason of its low first cost and capital and maintenance charges; where the hours worked are many the engine scores in spite of its higher first cost, its heavier maintenance charges and its unquestionably shorter life, because of the lower cost of its fuel per horse-power hour. Every case, however, must be considered on its merits, and it is of the utmost importance that the actual cost of the unit to the farmer should be established, taking into account capital charges for the cost of connecting and wiring—which are not always easy to establish, particularly where a lighting load is included in the installation. Where the comparative costs of the two forms of power are reasonably close, there is always a clear case for the electric motor on the grounds of convenience, cleanliness and other unseen assets, providing always that a definite continuity of supply, to which further reference will be made later, can be promised.

For the minor machines of the farm, such as milk separators, graders, pumps and the many applications where a fractional horse-power motor will handle a hand-operated drive, the electric motor possesses an indisputable superiority over any internal combustion engine, unless this is already driving a machine providing an effective load through a line of shafting. Below a certain rating internal combustion engines are unsatisfactory for continuous running, and particularly unsatisfactory as regards their speed regulation and governing.

As an example of comparative costs the following instance may be cited, the question at issue being the provision of power supply for a pump for a large market garden in the Thames Valley:—

	<i>30-h.p. Oil engine.</i>	<i>30-h.p. Motor.</i>
Overheads (per annum)	£40	£9
1,000 h.p.-hours running—		
Oil at 4d. per gal.	£1 10s.	—
Electricity at 1d. per unit ..	—	£3 10s.

The saving in running cost by the engine (£2 per 1,000 horse-power hours) does not balance the saving of £31 in overheads in favour of electricity until some 15,000 h.p. hours are run annually. If the average output is 20 h.p. then electricity is cheaper up to 750 hours' running. This

ELECTRIFICATION IN ENGLISH FARMING

takes no account of cost of cables and wiring, nor does it allow for the cost of oil-fuel storage, making road good for access to fuel store, and incidental labour and attention necessary with the engine. In most cases oil will be purchased in 40-gallon barrels at 7*d.* per gallon, so that the equivalent electrical figure would become nearly 2*d.* per unit for the same running time.

The constant speed of the electric motor is one of its greatest advantages for farm work; its freedom from vibration obviates the need for laying special foundations and greatly simplifies its installation in farm buildings.

In the last few years a number of portable motors specially evolved for farm use, and in some instances, e.g., the G.E.C. drum motor, of extremely ingenious design, have been introduced. Opinions differ as to the value of these special motors, which in most instances are considerably higher in cost than normal industrial patterns. The multi-spindle geared motor, giving a range of several pulley speeds, has its advantages, particularly where it is called upon to drive a wide variety of machines, but this type appears to have made less headway in this country than on the Continent. It is claimed by some supply engineers that a fixed motor driving a line of shafting to which the heavier of the farm machines are connected, and to which lighter or less-frequently-used appliances can be brought when required, has in its favour the fact that a cheaper motor can be used, and it is easier to provide a robust and damage-proof system of switchgear, connexions and earthing than if the motor has to be provided with a flexible connexion. Actually both fixed and portable forms of motor may be found side by side in farms; usually the larger motors are fixed, and the smaller—up to 5 b.h.p.—mounted on skids or wheeled carriages, with a flexible connexion to a number of alternative plug-in points. No cases of accident through the failure of the earthing arrangements to the motor frame have so far come to notice. On one farm this arrangement has been reversed, and a large motor, giving up to 45 b.h.p. but usually delivering under 20 b.h.p., has been arranged with its switchgear, as a portable machine, driving threshing boxes and other stack-yard machinery in the summer out of doors and a large rack saw under cover in the winter.

One of the hindrances to the more general use of portable motors is the stringency of wiring regulations in this

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country. In some parts of France the portable motor has even become a machine for the agricultural contractor, and as such may be found driving the larger farm machinery, and connected direct to the mains through conductors mounted on light bamboo poles provided with hooks at their upper ends. This has been done in this country on privately-erected overhead lines.

As a possible compromise between the permanent and the portable motor it might be suggested that the provision of alternative slide rails and plug points in various parts of the farm buildings might go far to meet the seasonal variation in the power needs of the farm, and spread the effective working hours of the most expensive item of the equipment, the motor, over a larger part of the year. As an example in point, a 5-h.p. motor originally installed to drive grain-cleaning machinery, and as such used for less than two months in the year, might in the winter months be used to drive a small grinding plant in a neighbouring pig-shed, sufficient grist being accumulated during the longer period here to carry over the needs of the harvesting months.

Beyond the uses already indicated, there are few of importance on the general farm. The employment of electricity for ploughing has been confined to a few enthusiasts in this island, and cannot compete on equal terms with the tractor. On the Continent and in North Africa, however, under less stringent wiring regulations, electric ploughing gear, consisting of motor-driven winches and gear similar to that used with the by no means obsolete steam plough, has made remarkable progress, and is in extensive use on some of the larger development schemes in Italy; while a smaller form, suitable for orchard and nursery cultivations, has some vogue in France, but has not yet been imported into this country. A possible application of these outfits might be found for the working of the soil in the large glass-houses that have become so notable a feature of the English countryside in the last few years.

The electric farm tractor suffers from the one grave drawback that it is limited in its sphere of action by its trailing cable. Although this is of minor importance in ploughing, since the so-called "one-way" ploughs can be used, for other field operations English practice demands a machine that can work round and round a field; and though Norwegian and Italian engineers have produced ingenious solutions that involve the suspension of the cable

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from a light tower in the centre of the field, this has obvious limitations.

In view of the increasing importance of the grain crop in the English farming system there is a growing need for more barn machinery for dealing with the harvested grain. The advent of the combine harvester has to a large extent revolutionized the practice of the larger farms, and has brought the cost of production down to or below that of the great grain-growing countries.

The most important item of permanent equipment, since it makes the grain harvest virtually independent of the weather, is the drier. All the types of drier in use require power to drive the fans and the elevators, and in the case of the horizontal belt and the rotating drum patterns, to drive the drier itself. Further power is needed for the secondary grain cleaning, and further machinery for this, particularly for malting barley, is increasingly recognized as necessary. Where the grain is sold as soon as possible after harvest the running time for all this machinery is less than two months, but with permanent bins and grain-handling equipment considerable demands may be made during the winter months.

All this equipment presents an ideal case for the electric drive, by reason of its low first cost, its flexibility, and its avoidance of countershafts and long belting—always difficult to install in old buildings; while an extension of the effective working hours of the motors may in many instances be obtained by the provision of alternative slide rails and connexions for other purposes as already indicated.

Of all the equipment on any farm, specialized or general, the pump is most clearly indicated as the first item to deserve electrification, and the most likely to win the farmer to an appreciation of the benefits of a connexion to the supply; and it is in small self-contained pumping units that the most spectacular progress has been made in the last few years. The ease with which constant level switching can be applied, making an installation entirely automatic in action, and the small space required for the units in comparison with any hand-operated pattern, are points in their favour, as are the very low initial expenses and costs of running. The modern pressure tank system, which provides an entirely automatic supply of water at a good pressure without the need for an overhead or gravity tank, is making rapid headway, and larger installations of this

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kind are clearly indicated for small village supplies, where the reduction of first cost is a primary consideration.

Although fruit spraying is a field in which the prospects of an increased consumption of electricity at the moment are not promising, the question of permanent installations with a fixed pumping unit and buried pipe lines through the orchards is receiving much attention. At least three such outfits in the south of England are electrically driven by 20-h.p. motors.

Other minor applications of electricity on the fruit farm are for grading, handling and packing of fruit, for which fractional h.p. motors are being used. A more important application is due to the recent introduction of cold and gas storage for fruit on a large scale, which can scarcely be dealt with by any other means.

Dairy farming is *par excellence* the section of farming in which there is most scope for electricity at the present day, and from the supply engineer's point of view has the virtue that it provides a steady load at known hours. The principal uses of electricity here are to drive milking machines; refrigerators for milk cooling, and for storage rooms; bottling machines and coppers; bottle washers; sterilizers for bottles and churns; hot-water boilers for scalding; cream separators; churns; and butter-working and cheese-making machinery. Although the increase in complexity of dairy machinery has been rapid in the last few years, under the steady demand for cleaner milk, the use of electricity has not grown at the same rate. The chief reason for this is apparently the fear of interruption of supply, particularly in rural areas that are still in process of development. If an alternative source of power must be installed for this reason, it is probably of a type that though less convenient to run, is cheaper, horse-power for horse-power, than electricity, and that would represent a dead loss of capital if scrapped. The milk trade, of all branches of farming, must run accurately to schedule time; loss of an hour may mean loss of important customers and contracts.

Improvement and reduction of cost is greatly needed in several main items of dairy equipment. Sterilizers, until recently, were a case in point, and the provision of a low-priced model, although relatively expensive as regards running costs, has done much to pave the way for a more general attack on the use of coal-fired steam boilers for this purpose. The electrically-heated boiler with its possibilities of an off peak or night load, whether as a simple, or a

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"latent steam" generator, so common in the States, has not yet come into service, although the thermostated storage heater, which has made such headway in the towns, is coming into use to provide water for scalding.

The poultry farms of to-day are tending to segregate into two classes: the small, owner-worked unit of perhaps some 2,000 birds as representing the most economically efficient size, and the larger farms dealing with several times this number and employing a considerable number of workers. Under the stress of intense competition the smaller farms are being driven to concentrate on egg and table bird production, and to leave the business of breeding and hatching to specialized establishments, which even the larger units can conveniently use. These specialized establishments naturally form a good field for the sale of current, since nothing has been found to compare with electricity for hatching, in "Mammoth" incubators or for brooding young stock. The dangers of current interruption during the hatching season have been found by experience to be less than was anticipated, though "stand-by" plant may still be found in many establishments; the losses here occur, when current fails, not among the unhatched chicks, but in those just emerging or "drying off," from suffocation due to failure of the fans that circulate air.

On the larger egg-producing farms electric lighting, controlled by a time switch, has been found to pay in the intensive houses, owing to the greater food consumption it makes possible: and an extra period of illumination at midnight has been found useful in reducing mortality among chicks in the first few weeks, when reserve vitality is low.

Since the question of feeding costs is important at a time when the margin of sales over costs is lower than it has ever been, most of the large farms are now installing power-driven mixing and other food-preparing plant, and the same is true of the larger pig-producing and fattening establishments. Pig-breeding, apart from this, forms no substantial outlet for the sale of electric power, though attempts have been made to introduce radiant heaters to minimize losses in farrows.

In the glasshouse section of the market garden industry some use has been made of the recently-introduced soil-heating cables, but their running cost has been found to compare unfavourably with that of hot-water pipes, except for some special purposes, such as mushroom growing,

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where there has been a revival of interest owing to the temporary nature of the beds and the difficulty of obtaining suitable horse manure. Another recent introduction of some commercial importance has been the introduction of forced firing, by electrically-driven fans, for greenhouse boilers, which permits the use of lower grades of fuel; and of electrically-driven circulators, which permit the use of smaller-bore heating pipes and a more uniform water temperature.

The question of low-tension distribution in rural areas is entirely outside the scope of this paper. Farm wiring, however, is a matter of some importance, to which attention has only recently been given by manufacturers. Of the various systems in use, the two that deserve most favourable mention are, for first quality work, galvanized screw conduit with V.I.R. cables and water-tight fittings, and for installations where economy is necessary, tough rubber-insulated or cable cable, with all junction boxes filled with a cold plastic compound. The conditions in farm buildings are exceptionally severe, involving extremes of heat and cold—and, under corrugated iron roofs very high temperatures may be reached—damp, and even actual wetting, apart from condensation, which must be carefully forestalled in conduit systems, and, in byres and stables, ammoniacal fumes; tough rubber insulation seems to stand up in practice to all these conditions. Its mechanical protection is sufficient for casual abuse, but where there is a risk of impact from animals, implements or vehicles, it should be run through short lengths of galvanized piping, left open at both ends.

Leakage protection for farm installations has recently received considerable attention. Certain Continental companies insist on sensitive current breakers which work with a leakage current of 60 milliamperes, and a British pattern has recently been produced which trips with a leakage of only 30 milliamperes. It is not within the restricted scope of this review to discuss the efficacy of these instruments or the more general subject of earthing, but it may be pointed out that unless some means of cutting out the sensitive trip were available serious loss might occur, for instance in a dairy installation, from a slight fault which did not involve a dangerous leakage. On the other hand, this would inevitably be abused in practice, with possibly deplorable consequences. An alternative, which might prove more satisfactory for farm work, would be a sensitive leakage relay

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actuating a warning lamp, or some similar signal, together with a sealed indicator which would show the supply company that a leakage had taken place.

The further development of electricity in agriculture is dependent, not on the introduction of new devices which will be of service to the farmer, but on the education of the latter to an appreciation of what can even now be done, and the economies in time, labour and convenience, if not always in expenditure, which the use of electricity makes possible.

From the farmer's point of view, the chief obstacle in the way of electrification is that he is unable, without considerable difficulty in most areas, to find the initial cost of a standard article like a 5-h.p. motor, the cost of connection and installation, and the cost of running when installed. Although there has been a great improvement in the price per unit and in the charges for connection in the last two years, the latter in particular is still the rock on which most schemes for farm electrification are wrecked, and where a heavy capital charge of this nature can be spread over a period of years, or, better still, be included in the price per unit for the current consumed, the chances of success in such negotiations is greatly increased. It is equally important that tariffs should be simplified and standardized. The two-part tariff, which in its usual form has many merits, requires a certain flexibility in its application. While in the case of modern and well-laid-out farm buildings and dwelling-houses it may be reasonable and attractive, in older farms with rambling buildings and much waste space, it may be substantially unfair in its incidence.

The situation as a whole as regards the development of the agricultural load seems, on review, most encouraging. The equipment is available in most instances, and of a quality and durability which no other country can match; the major problems of installation have been solved, and progress has been made towards an equitable solution of the question of reasonable charges and costs. The main line of attack which should now be made is in the direction of education and demonstration; and demonstration as far as possible, as the writer has urged in a previous paper,* under strictly farming conditions.

* H. J. Denham: "Electricity in mechanical farming." *Scot. Jour. Agric.*, April, 1933.

SULPHURIC ACID SPRAYING OF POTATO HAULM TO PREVENT LATE INFECTION OF THE TUBERS WITH BLIGHT

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It is generally believed that the potato "Blight" fungus (*Phytophthora infestans*) gains entrance to the tubers during the growing season by the washing down of the spores from the foliage and stems through the soil and on to the tubers, and also, at the end of the season, by spores from blighted haulm that come into contact with the tubers at lifting time. It is therefore reasonable to suppose—indeed it has already been proved—that destruction or removal of blighted haulm before lifting begins will prevent this late infection occurring. The old practice of mowing down and sometimes burning the haulm was carried out with this object, but apart from the great expense involved this procedure cannot be carried out with high efficiency as the shaking of the haulm during mowing and removal causes many spores to fall to the ground, to be subsequently carried to the tubers.

A few years ago Dr. H. C. Brown, of King's Lynn, experimented with dilute sulphuric acid and found that, when applied in the correct manner, it was a most effective means of destroying the haulm. Several large growers in Lincolnshire and Norfolk became interested and gave the process a trial on a large scale, so that in 1934 approximately 3,500 acres of potato haulm were treated, and gave results that were stated to be entirely satisfactory.

These growers made the claim that the tubers from the unsprayed areas, on being taken out of the clamp, frequently contained up to 50 per cent. of "blights," whereas those from the sprayed area were almost completely free from the disease. The operation was regarded as a more efficient one than mowing, and it had the additional advantage that the weeds were also destroyed. Although these claims emanated from reliable sources, they were, admittedly, based upon empirical field observations, but made on a large scale. For this reason it was felt that a critical field trial, laid down in such a way as to yield data that could be submitted to statistical examination, was very desirable.

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Sulphuric Acid Spraying Trial, 1934-35.—A trial was accordingly carried out upon a crop of King Edward potatoes on the farm of Mr. C. W. Cave, Terrington St. Clement, King's Lynn. The crop was sprayed on September 16, 1934, on a hot and sunny day with a drying wind. The treatments were as follows:—

1. Unsprayed (control).
2. Sprayed with 100 gal. per acre 10 per cent. solution (by volume) of B.O.V.*
3. Sprayed with 100 gal. per acre 20 per cent. solution (by volume) of B.O.V.*

* B.O.V. = Brown Oil of Vitriol, containing 77 per cent. of Sulphuric Acid.

The acid was applied by a horse-drawn spraying machine of standard type having a horizontal spray-bar 16 ft. 6 in. wide fitted with 22 delivery nozzles.

Each treatment was replicated four times, thus giving a total of twelve plots, which were arranged in a randomized block manner.

Each plot was 260 yards long and comprised seven rows each 28 in. wide, running the full length of the field.

Although at the time of application only a few plants were noticed to be affected by Blight, within three weeks the disease had spread all over the control plots, but could not, however, be regarded as a severe outbreak.

Before it was sprayed the haulm was green and a fairly considerable amount of weeds was present. Both haulm and weeds were rapidly killed by the acid, becoming brown and withered within the space of two hours. Indeed, a striking feature of the sprayed plots was the complete destruction of annual weeds, chiefly Chickweed, in contrast with the dense growth of weeds on the controls.

The plots were harvested on October 6, the following method being adopted:—

The two outer rows in each plot were discarded, and of the remaining five rows, one chosen at random was lifted and set aside for weighing. Thus the area lifted from each plot consisted of a single row 260 yards long by 28 in. wide, or approximately one twenty-fourth of an acre. It was considered that long single-row plots would give more reliable figures than shorter and wider ones, there being a greater possibility with the former method of intersecting the somewhat irregularly distributed blighted areas of the field.

The tubers were all stored in the same clamp, but the produce of each of the single row plots was kept separate from the others by a partition of straw.

Result of Trial.—On January 30, 31 and February 1, 1935, after seventeen weeks had elapsed, the clamp was opened, and the tubers were riddled, graded and sorted for "blights" in the manner commonly practised in the dis-

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strict. The produce was separated into "ware" over a $1\frac{1}{2}$ -in. riddle, "seed" over a $1\frac{1}{4}$ -in. riddle, and "chats" through a $1\frac{1}{4}$ -in. riddle. "Lumps" or unblighted tubers, misshapen or cracked and unfit for the best trade were also set aside.

After the potatoes had been sorted all diseased tubers were picked out and submitted to careful examination by the writers. Those not showing typical Blight lesions were weighed separately and are included under "miscellaneous diseases." This class all showed development of moulds or attack by Dry Rot (*Fusarium*), probably contracted in the clamp and representing a very small percentage of the whole.

The results of the trial are set out in the tables below:—

TABLE I.
YIELD PER ACRE (CWT.).

<i>Strength of Solution.</i>	<i>Total Yield.</i>	<i>Ware.</i>	<i>Seed.</i>	<i>Chats.</i>	<i>"Lumps."</i>	<i>Miscellaneous.</i>	<i>"Blights."</i>
Unsprayed	238.1	188.0	11.7	4.2	24.2	0.6	9.4
10% spray	240.7	194.0	12.3	4.0	28.0	0.8	1.6
20% spray	247.3	204.0	11.2	4.4	26.2	0.3	1.2
Standard error ..	0.62	—	—	—	—	—	1.40

TABLE II.
PERCENTAGES OF TOTAL YIELD.

<i>Strength of Solution.</i>	<i>Ware.</i>	<i>"Lumps."</i>	<i>"Blights."</i>
Unsprayed	79.0	10.2	3.9
10% spray	80.6	11.6	0.66
20% spray	82.5	10.6	0.49
Standard error	0.51	0.75	0.39

Consideration of the Results.—It must first be stated that in considering the results no differences are regarded as significant if they do not exceed their respective standard error by three times. The results show that in the dry season that prevailed in 1934 there was no significant difference in total yield, although growth on the sprayed plots came to an end three weeks before the time of lifting, whilst it continued on the unsprayed plots.

The experiment clearly shows that there is a large increase in the weight of "blights" from the unsprayed plots. The weight of "blights" obtained from the plots treated with 10 and 20 per cent. solutions was very small, and it would appear that in this case a 10 per cent. solution had been as effective in reducing disease in the tubers as a 20 per cent. solution. Expressing the yield of "blights" as a percentage of total yield, it will be seen that on the sprayed plots

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it was not more than 0.66 per cent., whereas on the unsprayed plots it was 3.9 per cent.

The increase in proportion of "ware" to total yield was just significant where 10 per cent. acid was applied as compared with the unsprayed, but was significantly greater where 20 per cent. acid was used.

The results also show that there was no significant difference in the proportion of "lumps" to total yield, and the spraying did not, therefore, influence the shape of the tubers produced.

The Financial Aspect.—A record was kept of the cost of the operation in order that an estimate might be made as to whether the treatment was justified from the commercial point of view. The total cost per acre, including labour, cost of acid and depreciation on the machine, was estimated at 14s. 6d. The "blights" from the control plots amounted to 9.4 cwt. per acre. From the total weight of "blights" (9.4 cwt.) per acre was deducted the average weight (1.4 cwt.) of "blights" per acre on the sprayed plots. The percentage of "ware" to total yield was approximately 80 per cent. in all cases on all plots, so that it was estimated that 80 per cent. of the balance (8.0 cwt.) were of "ware" size. The figures show that there was a net saving of 6.4 cwt. per acre. The "ware" was valued at 4s. per cwt. so that the loss of "ware" by "blights" was valued at 25s. 7d. After deducting the cost of spraying, a profit of 11s. 1d. per acre was left. It should, however, be borne in mind that the incidence of the attack was in this case slight; in a season favourable to Blight epidemics the profit would almost certainly be considerably greater. Instances are known where the "blights" have amounted to as many as 8 cwt. per ton of "ware" from unsprayed areas, whereas adjacent sprayed areas have yielded less than 1 cwt. of "blights" per ton of "ware." In such cases the financial advantages accruing from spraying are obviously far greater. Further, the writers made no attempt to assess the value of the labour costs saved, owing to the easier lifting of the crop resulting from the destruction of the haulm and weeds.

Apart from the financial advantages of treating an infected crop, growers state that the destruction of the haulm enables them to start lifting when convenient, as it is not necessary to wait until the haulm has died down. In this

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way the most favourable date for marketing the crop can be selected. Finally, growers who wish to obtain "immature" seed are enabled to stop growth at the correct time by spraying with acid.

Summary.—Experiment has shown that even when the incidence of Blight is slight, spraying at the proper moment with dilute sulphuric acid reduced the loss of "ware" incurred by a late attack of Blight to a minimum. Growth was stopped three weeks before the normal time of lifting by the application of the acid, but the results show that the total yield was not affected, and the proportion of "blights" to "ware" was reduced on the sprayed plots.

The costings of the experiment show that the treatment was justified, and it is reasonable to assume that with a late serious attack of Blight, the margin of profit left after defraying the cost of spraying would be substantially greater. Lastly, the advantages of destroying the haulm and also weeds are considerable, apart from the main object of minimising losses from Blight.

Warning.—Sulphuric acid should be handled with particular care. In preparing a solution for spraying, *it is most important that the acid should be poured into the water*, and not the water into the acid. Workers are recommended to wear rubber boots, and goggles might also be worn as a precaution for the safety of the eyes. If the acid or acid solution gets into cuts or sores, they will become exceedingly painful; and it may be desirable to have a solution of soda handy in case of need.

ACKNOWLEDGMENTS.—The writers wish to thank the National Sulphuric Acid Association for the loan of a sprayer, and the assistance of their officials; also Mr. C. W. Cave, on whose farm the trial was carried out; and Mr. E. T. Sykes, M.A., who undertook the statistical examination of the results.

AN ANALYSIS OF SOME EGG FAULTS—I

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THE introduction, in 1929, of the National Mark Egg Scheme in England and Wales focussed attention upon the fact that eggs, even new-laid eggs, vary in quality, and that, under the candling lamp, certain eggs are characterized by the possession of blemishes or faults which render them unsuitable for sale as eggs of first quality. Since the occurrence of such faulty eggs forms a direct loss to the producer, an inquiry into the incidence of such faults appeared to be desirable, in the hope that the results of such an investigation might suggest a means of eliminating the causes from the laying flocks of this country.

The eggs used for the purpose of this investigation were obtained from the West Suffolk County egg-laying trials, and were inspected and classified by an expert candler at the Bury St. Edmunds Egg-Packing Station. The period of collection extended over the seasons 1931-32, 1932-33, and 1933-34. The entire output of the eggs from the egg-laying trials during the period of test was candled, and each egg was marked with the number of the hen that laid it. It thus became possible to ascertain the extent to which faulty eggs occurred in birds of the high-producing type; and, furthermore, whether a particular fault was associated with the individual hen or with an individual strain. The collection and delivery of the eggs took place once weekly, the eggs being candled as soon as possible after arrival. The eggs when candled were consequently from one day to approximately seven days old. During the season 1931-32, the eggs candled were the output of the last nine lunar months of the trial; during 1932-33, the last ten months of the trial; and, during 1933-34, the whole twelve lunar months of the trial.

All birds were housed under similar conditions, received the same treatment throughout with regard to feeding and management, and had access to a similar amount of grass run. The system of management was semi-intensive. The

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particulars of breeds and numbers of birds in each breed are given in the Table I.

TABLE I.

<i>Breed.</i>	<i>No. of Birds.</i>					
	1931-32.		1932-33.		1933-34.	
Rhode Island Reds ..	162	..	174	..	144	
White Wyandottes ..	72	..	48	..	66	
Barred Rocks ..	6	..	6	..	—	
Buff Rocks ..	—	..	6	..	—	
Australorps ..	12	..	6	..	6	
Light Sussex ..	24	..	24	..	60	
Brown Leghorn ..	6	..	—	..	12	
Buff Leghorn ..	6	..	—	..	6	
Black Leghorn ..	6	..	12	..	6	
White Leghorn ..	66	..	78	..	60	

Feeding.—The birds received a fixed grain ration of 2 oz. per bird per day, with unlimited mash; and had access to limited grass runs carrying a fair proportion of white clover. In the winter, thousand-head kale was fed daily during the season 1931-32. The grain ration consisted of three parts by weight of wheat and two of kibbled maize. The mash ration, fed dry, consisted of:—

						<i>Parts by Weight.</i>
Bran ..	..	..	..	..	..	15
Middlings ..	..	..	..	..	..	40
Maize meal ..	..	..	..	..	..	22½
Sussex ground oats ..	..	..	..	..	..	10
Fish meal ..	..	..	..	..	..	12½

Oyster shell and flint grit were always available; and, during high-producing periods, a proportion of steamed bone flour was incorporated in the mash.

The number of eggs from the trials passed through the packing station were, in 1931-32, 46,937; in 1932-33, 55,490; in 1933-34, 62,404; making a total throughput of 164,831 eggs. The relative percentages of faults in the three years were: 1931-32, 1.89 per cent. (886 faulty eggs); 1932-33, 3.04 per cent. (1,688 faulty eggs); 1933-34, 3.21 per cent. (2,002 faulty eggs).

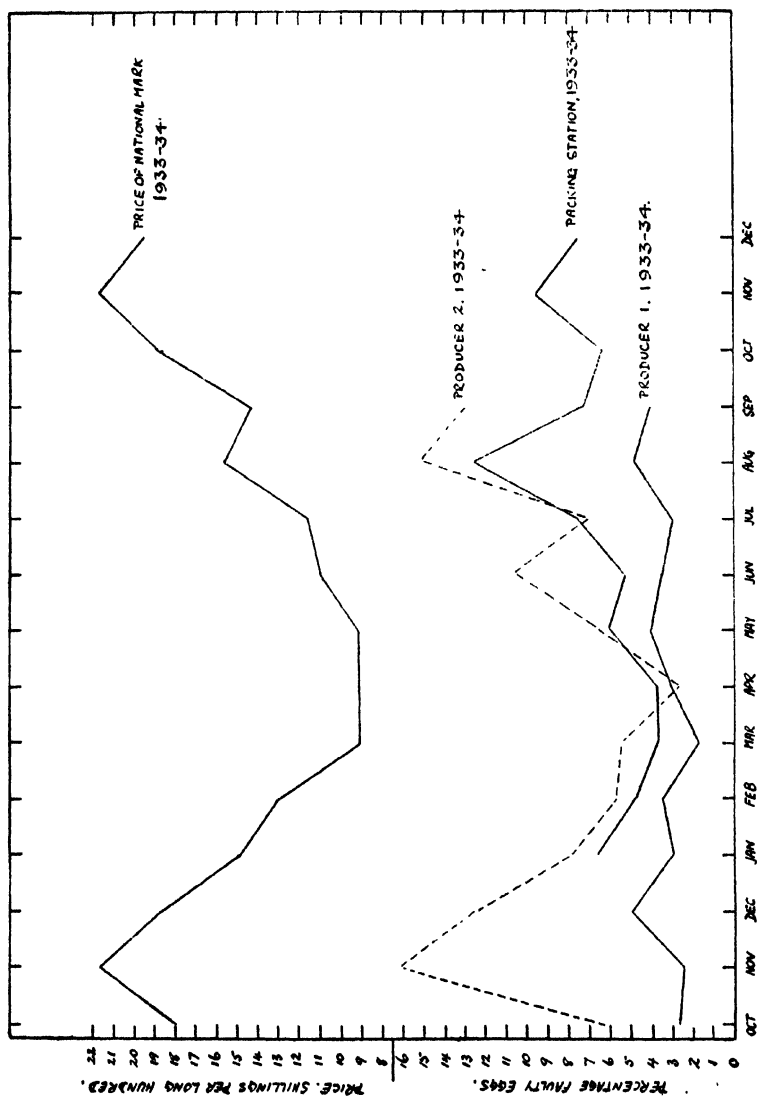
Relation of Percentage of Faults from Trials with those from the Area of Collection of the Packing Station.—Since the birds received at the trials were birds of potentially high egg capacity, and since the general impression has gained ground among poultry keepers that birds of this character produce more faulty eggs than those not so intensively bred, it appeared desirable to ascertain, if possible, how the county egg-laying trial birds compared in this respect with those drawn from the general producer. Through the kindness and co-operation of Mr. Eaton

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Goldsmith; the manager of the packing station, it became possible to test this point. From the entire throughput of eggs during the year 1933-34, the average of faulty eggs worked out at 6.17 per cent., as compared with 3.21 per cent. from the egg-laying trials. Consequently, there appears to be no basis for the assumption that birds of the type going to egg-laying trials throw a larger percentage of faulty eggs than those bred by the general producer. Indeed, the reverse is the case. It would appear, therefore, that either the birds bred by the general poultry producer are worse-bred in this respect, or that some other cause is operating to explain the difference. There is, admittedly, a tendency on the part of some producers to hold up egg supplies before marketing during periods of rising egg prices; and, if this were the case, it would result in increasing the percentage of faulty eggs when candled, as compared with the egg-laying trial eggs, since, in the latter case, no such hold up of supplies could occur. The total percentage faults occurring each month at the packing station, the percentage faults occurring in the case of a supplier whose percentage egg faults were low, and the percentage faults occurring in the case of a supplier whose percentage egg faults were high, were therefore plotted against the general monthly price level of National Mark eggs.

Study of the graph (p. 239) will reveal the fact that, as a general trend, the percentage of faulty eggs increases or falls as the price level increases and drops. This coincidence of increase in faults with rise of price might conceivably be due either to the individual supplier holding up eggs during the rise in price, or to the packing station grading more severely during rises in egg prices. Study of the two producer-graphs shows, however, that the former interpretation is the correct one, since the supplies from the supplier with the large percentage of egg faults shows the same general trend as the price level curve, whereas the supplier with the low percentage of egg faults shows no such trend. It is also significant that the respective percentages of faults in these two producers' supplies tend to approximate at the period of lowest egg prices, and that the percentage of faults at the time of lowest egg prices approaches that of the egg-laying trial birds. It may, therefore, be accepted that hold-up of eggs during times of price rise is a possible contributory factor in the causation of egg faults, and that the tendency

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Relation of the percentage of faulty eggs to price level (see p. 238).

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to produce faulty eggs is no greater among the general producer's birds than among the egg-laying trial birds.

Types of Egg Faults Recognized.—From the table of incidence of faults which follows, it will be noted that no less than 24 types of faults were recognized by the candler carrying out the egg inspections. From inspections of the individual hen records, it became evident that the candler was consistent in recognizing the particular condition associated with a particular fault, since a particular fault tended to recur frequently in the faults thrown by a particular hen, although the inspection was carried out throughout the season and it was physically impossible for the candler to carry in her mind an association between a particular hen's number and a particular fault. It has, however, become apparent that the nomenclature of egg faults requires standardization, since the terms at present used by the packing stations and the trade are not always applied to the same condition of egg fault. Thus, in the case of watery whites, this term is applied sometimes to the running air cell condition, sometimes to the rapidly-rotating yolk condition, sometimes to the trembling airspace condition, and sometimes to the very visible yolk condition. In this paper, the term "watery white" has been confined to the "running air cell" condition.

In view of this confusion of nomenclature, it was thought desirable to state that the term "floating yolk," as used by us, refers to the rapidly-rotating yolk condition, and that the term "mashed yolk" refers to yolks with irregular outline (the yolks of such eggs when broken open in a dish are devoid of elasticity and spread out like a pancake. We understand that in practice it is unusual for candlers to throw out eggs which merely have rapidly-rotating yolks, or to call such yolks "floating." In fact, a "floating" yolk as usually recognized rotates *slowly* (see 4 (b) (1) of Marketing Leaflet No. 28), and corresponds more with the "mashed" yolk described in this report. Dropped yolks refer to the condition where the yolks settle at the bottom instead of remaining firmly anchored in the centre of the egg.

Incidence of Faults.—The incidence of faults in eggs is important in view of the possibility of research being initiated on egg quality, since it would be uneconomic to

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sidetrack the energies of research workers on investigation of faults which, although of extreme interest in themselves, are of minor character. For this reason, Table II has been compiled from the data available.

TABLE II.
WEST SUFFOLK COUNTY EGG LAYING TRIALS:
INCIDENCE OF FAULTS.

	1931-32			1932-33			1933-34			1931-34		
	Per- cent- age of faults	Per- cent- age of eggs		Per- cent- age of faults	Per- cent- age of eggs		Per- cent- age of faults	Per- cent- age of eggs		Per- cent- age of faults	Per- cent- age of eggs	
Watery white ..	284	28.91	.546	344	18.08	.550	194	8.73	.280	822	16.09	.447
Large airspace ..	85	8.65	.163	423	22.24	.676	368	16.55	.531	876	17.15	.477
Deformed shell ..	89	9.06	.171	228	11.98	.364	339	15.25	.489	656	12.84	.357
Weak and thin shell ..	65	6.62	.125	32	1.68	.051	87	3.91	.125	184	3.60	.100
Mashed yolk ..	35	3.56	.067	27	1.42	.043	40	1.80	.058	102	2.00	.056
Dropped yolk ..	82	8.35	.158	313	16.45	.500	204	9.18	.295	599	11.73	.326
Floating yolk ..	57	5.80	.110	29	1.52	.046	180	8.10	.260	266	5.21	.145
Meat spots ..	94	9.57	.181	276	14.51	.441	510	22.94	.730	880	17.23	.479
Blood spots ..	97	9.87	.186	142	7.46	.227	174	7.83	.251	413	8.09	.225
Blood eggs ..	46	4.68	.088	38	2.00	.061	22	0.90	.032	106	2.08	.056
Weak yolk ..	1	0.10	.002	—	—	—	—	—	—	1	0.02	.0005
Cerm spot ..	—	—	—	28	1.47	.045	29	1.30	.042	57	1.12	.031
Cloudy ..	37	3.77	.071	11	.58	.018	46	2.07	.066	94	1.84	.051
Trembling air-cell	4	0.41	.008	2	.10	.003	2	0.09	.003	8	0.16	.004
Adherent yolk ..	—	—	—	3	.16	.005	1	0.04	.001	4	0.08	.002
Heat spots ..	—	—	—	5	.26	.008	6	0.27	.009	11	0.22	.006
Mould growth ..	—	—	—	1	.05	.001	—	—	—	1	0.02	.0005
Treacle yolks ..	—	—	—	—	—	—	3	0.13	.004	3	0.06	.0016
Fatty substance	—	—	—	—	—	—	9	0.19	.013	9	0.18	.005
Resembling tapeworm ..	—	—	—	—	—	—	1	0.04	.001	1	0.02	.0005
Yellow albumen ..	—	—	—	—	—	—	4	0.18	.006	4	0.08	.002
Double yolk ..	—	—	—	—	—	—	2	0.09	.003	2	0.04	.001
Abnormality ..	—	—	—	—	—	—	1	0.04	.001	1	0.02	.0005
Foreign body ..	—	—	—	—	—	—	1	0.04	.001	1	0.02	.0005
rejects ..	6	0.61	.011	—	—	—	—	—	—	—	—	—
Total eggs ..	46,937			55,490			62,404			164,831		
Total faulty eggs	886			1,688			2,002			4,576		
Percentage of faulty eggs	1.89			3.04			3.21			2.78		

It will be obvious, from Table II, that the faults of major importance from the point of view of frequency of occurrence are meat spots, large airspace, watery white, deformed shell and dropped yolk. Since watery whites, as defined by us, and eggs with large airspace, cook and poach well, these faults, though serious in their incidence, would not be apparent to consumers, and it therefore becomes a moot point whether they should be regarded so

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seriously as they apparently are by the trade. In addition, rapidity of rotation of the yolk should not be regarded as a fault, since such eggs, when broken open, are characterized by a firm upstanding yolk with a large ratio of thick white to thin white. This latter fact has been established by one of us in the following manner:—

Of 199 eggs laid by twelve cross-bred hens, supplied by the National Institute of Poultry Husbandry, 60 showed a rapid rotation of the yolk when candled, and 139 exhibited a normal movement. Each of the eggs was then broken open, the white separated from the yolk, and the white then further separated into thick and thin white by means of a funnel made of zinc sheet perforated with holes of suitable dimensions (1 mm. diam.) The relevant data obtained are summarized in Tables III and IV.

TABLE III.
DISTRIBUTION OF EGGS ACCORDING TO TOTAL AMOUNT OF WHITE.

<i>Weight of white in gram.</i>	<i>No. of eggs.</i>		<i>Percentage of total eggs.</i>	
	<i>Fast rotating yolks.</i>	<i>Normal rotating yolks.</i>	<i>Fast rotating yolks.</i>	<i>Normal rotating yolks.</i>
25 to 26 ..	1	3	1.7	2.2
27 to 28 ..	2	28	3.4	20.3
29 to 30 ..	15	47	25.4	34.6
31 to 32 ..	23	32	39.0	23.2
33 to 34 ..	10	16	16.9	11.6
35 to 36 ..	6	8	10.2	5.8
37 to 38 ..	2	4	3.4	2.9

TABLE IV.
DISTRIBUTION OF EGGS ACCORDING TO PERCENTAGE OF THICK WHITE PRESENT.

<i>Percentage of thick white.</i>	<i>No. of eggs.</i>		<i>Percentage of total eggs.</i>	
	<i>Fast rotating yolks.</i>	<i>Normal rotating yolks.</i>	<i>Fast rotating yolks.</i>	<i>Normal rotating yolks.</i>
32 to 26 ..	1	2	1.6	1.4
37 to 41 ..	0	7	—	5.0
42 to 46 ..	1	9	1.7	6.5
47 to 51 ..	1	14	1.7	10.1
52 to 56 ..	16	45	26.7	32.4
57 to 61 ..	20	30	33.3	21.6
62 to 66 ..	15	20	25.0	14.4
67 to 71 ..	6	9	10.0	6.5
72 to 76 ..	0	2	—	1.4
77 to 81 ..	0	0	—	—
82 to 86 ..	0	1	—	0.7

Inspection of the above tables will show that the eggs with fast-rotating yolks not only possessed a larger weight of total white than the normal, but also contained a larger proportion of thick white to thin white. Since it has been

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assumed in the past that a rapid rotation of the yolk, when the egg is twisted in front of the candling lamp, indicates a greater fluidity of the white, eggs exhibiting this phenomenon have, in certain instances, been regarded as second grade, and have, indeed, by some candlers, been classified as watery white. It is evident from the facts given that there is no valid basis for this assumption, the reverse being the case. A possible explanation of the differences obtained when eggs are classified according to rapidity of yolk movement is that the thick white and the yolk move together, the thin white surrounding the thick white forming an efficient liquid lubricant and the two chalazae acting as the axis of rotation. In such an instance, a yolk surrounded with a large amount of thick white would spin more rapidly than one with less, since the central rotating mass would be greater with the former than the latter.

From the point of view of the consumer, the faults that would be regarded as serious are those which make the egg unattractive in appearance when exposed for sale or when cooked. Such faults would be deformed or thin shell, weak yolk membranes, discoloured yolks, meat spots or blood eggs.

Relation of Faults with Time of Year.—In order to ascertain whether the time of the year bore any relation to the incidence of faults, the percentages of faults occurring in each month were extracted from the data and are given in Table V.

Consideration of the figures given in Table V shows that the percentage of faulty eggs tends to rise in the summer months. As regards large airspace, it would be natural to assume that the increase is due to the combined effect of high temperature and low humidity, conditions which would favour increased loss of water from the egg. The remarkable difference between the September percentages and the October percentages indicates, however, that a factor or factors other than time of year is operating to produce the apparently seasonal rise in percentage faults. The eggs produced in October are obtained from birds just coming into production, whereas those obtained in September are obtained from birds at the end of their productive season. The strain on the physiological mechanisms involved in egg production would, presumably, increase as egg production proceeds during the individual's season of laying; and,

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TABLE V. INCIDENCE OF FAULTS IN RESPECTIVE MONTHS

Season 1931-1932	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Total eggs ..				2,991	5,852	6,447	7,850	7,576	5,286	4,511	5,299	2,418
Percentage:												
Faulty eggs ..				0.6	0.9	1.9	1.8	2.1	2.2	1.9	2.0	3.5
„ Watery whites				0.27	0.14	0.34	0.42	0.56	0.85	0.49	0.96	1.7
„ Meat spots ..						0.05	0.17	0.13	0.30	0.40	0.26	0.83
„ Dropped yolk				0.07	0.17	0.22	0.22	0.21	0.19	0.04	0.09	0.25
„ Large airspace							0.13	0.07	0.38	0.42	0.45	0.29
„ Deformed shell				0.03	0.10	0.22	0.39	0.30	0.17	0.07	0.02	0.64
Season 1932-1933												
Total eggs ..			5,463	7,113	5,708	6,432	6,693	7,311	5,007	4,548	5,343	1,872
Percentage:			1.3	1.6	1.6	1.4	2.5	3.5	6.9	3.8	3.7	6.9
Faulty eggs ..												
„ Watery whites			0.27	0.38	0.37	0.48	0.67	0.59	1.23	0.94	0.92	0.43
„ Meat spots ..			0.20	0.24	0.28	0.25	0.22	0.30	0.56	0.90	1.22	2.14
„ Dropped yolk			0.38	0.36	0.47	0.23	0.33	0.55	1.31	0.48	1.10	0.80
„ Large airspace			0.09	0.06	0.05	0.03	0.76	1.47	2.19	0.88	1.08	2.3
„ Deformed shell			0.02	0.15	0.10	0.19	0.48	0.33	0.84	0.39	1.10	1.23
Season 1933-1934												
Total eggs ..	5,339	5,238	4,694	6,260	5,311	6,170	8,155	5,636	4,975	5,612	4,266	742
Percentage:	1.0	1.8	2.7	1.2	2.6	2.7	2.6	3.5	3.6	4.1	11.0	7.4
Faulty eggs ..												
„ Watery whites	0.06	0.15	0.17	0.03	0.23	0.18	0.29	0.43	0.52	0.41	1.10	0.80
„ Meat spots ..	0.30	0.48	1.13	0.45	0.75	0.52	0.55	0.49	1.13	1.10	2.83	0.67
„ Dropped yolk	0.06	0.27	0.19	0.18	0.23	0.41	0.29	0.31	0.40	0.23	1.17	0.80
„ Large airspace	0.26	0.40	0.43	0.11	0.30	0.70	0.29	0.76	0.72	0.80	2.01	1.9
„ Deformed shell	0.21	0.34	0.23	0.08	0.41	0.32	0.51	0.63	0.70	0.82	1.97	1.9

as the effect of this factor would operate at the same time as that of time of year, it is impossible to state with any degree of certainty that the increase in percentage in faults during the summer months is due to effect of season of the year. The only method of differentiating between the effect to time of year and the period of production of the hen would be to compare the faults obtained from two flocks of birds so reared that, at the time of candling, one flock was near the beginning of its laying period and the other was near the end. It would also be desirable that this test should be carried out during a summer month, when egg faults are at a maximum, as well as during a winter month, when the egg faults are at a minimum. Through the courtesy and co-operation of Mr. H. A. Saltmarsh, it became possible partially to test this point. On March 15, 1935, two lots of 1,080 eggs were candled from (a) a flock of heavy cross-bred pullets which had been in lay for about six weeks, and (b) a similar flock which had been in lay for about eleven months. The result of the test is shown in Table VI.

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TABLE VI.

<i>Date of laying</i> <i>March 1935</i>	Flock in lay 6 weeks							Flock in lay 11 months						
	8	9	10	11	12	13	Total	8	9	10	11	12	13	Total
Dropped yolk ..	5	4	3	5	1	1	19	4	3	1	2	1	2	13
Floating yolk and/ or large airspace ..	—	2	1	3	3	2	11	3	4	2	—	4	1	14
Double yolk ..	4	3	2	2	4	2	17	—	1	—	3	—	1	5
Meat spots..	2	2	1	2	2	2	13	—	3	1	3	2	0	9
Cracks ..	—	—	1	2	2	1	6	2	1	2	3	3	1	12
Thin or deformed shell ..	—	1	—	—	—	1	2	2	2	2	2	—	1	9
Watery white ..	—	—	—	—	—	—	0	1	—	2	1	—	—	4
Blood ..	—	—	—	1	—	1	2	1	1	—	—	1	—	3
Total..	11	12	10	15	12	10	70	13	15	10	14	11	6	69

It is apparent, from the evidence obtained from this sample, that the time during which the birds have been in lay does not appear to exert any great influence on the tendency of a bird to produce faulty eggs, if one considers the totals only; and it is, therefore, apparent that the possibility of the climatic conditions due to the time of year affecting the production of faulty eggs needs further investigation. It will be noted, however, that there is a tendency for an increased production of weak, thin and deformed shells as the period of laying is prolonged, since those birds 11 months in lay produced 21 faults of this character as against 8 in the case of those birds approximately 6 weeks in lay. Watery whites, too, only occurred in the birds that had undergone a prolonged period of lay, and it is noteworthy that the tendency to produce double-yolked eggs is greater in the case of birds which have only recently come into lay. The need for further investigation is therefore obvious, since both climatic conditions and time of lay appear to play some part in the occurrence of certain of the faults in eggs, but the data available in this investigation are such as to preclude any positive assertion of definite proof in either direction.

(To be concluded)

BLACKHEAD DISEASE OF TURKEYS

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TURKEY-BREEDERS hatch and rear large numbers of turkeys for the Christmas market, and many farmers also put down some eggs, in the hope that this sideline may bring in at least enough profit to pay the rent. If they have had any turkeys before, they will know that they are difficult to rear, especially during their first three weeks or so of active life, and that the disease called blackhead may cause considerable losses.

Blackhead is sometimes blamed for losses due to faulty rations and other causes, but nowadays there should be little difficulty in diagnosing it. That it need not be dreaded nor regarded as inevitable is shown by the work done upon it in America, from which country the turkey originally came to England. Tyzzer, who has been working on this disease at intervals since 1919, has shown that turkeys can be reared and kept free from blackhead in the midst of birds that are suffering from it, if they are properly screened from the infection. It has therefore become possible for American producers to rear several thousand healthy birds by proper management alone; this is an important advance, because no drug is known that will either cure or prevent the appearance of the disease.

The name blackhead was given to it because occasionally birds suffering from it show a dark blue discoloration of the unfeathered parts of the head, but this is not often seen. The disease takes 11-17 days to appear after healthy birds have been infected experimentally with it, the usual incubation period being 11 days. It is probably wise to assume that under farm conditions it may take longer to appear, and to isolate birds for a month or so when they have been in contact with infection, before assuming that they have not caught the disease.

The first symptoms are usually weakness, drooping wings, lagging behind the rest of the flock or standing for long periods bunched up with the head beneath the wing. The bird either eats little or its appetite varies a great deal. Birds showing these symptoms should be isolated at once upon fresh land well away from the others, and their droppings

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watched for the appearance of the sulphur-yellow material which is characteristic of the acute stage of the disease, although it does not always appear. Turkeys get coccidiosis and other affections of the intestine, which are not due to blackhead, but it is probably wisest to regard all suspicious cases as blackhead and to isolate them at once. These isolated birds should not be returned to the flock even if they recover. A permanent hospital well away from the healthy stock will save many subsequent losses. The reason for this will be evident when the experimental work done in America is considered.

The two main features in the success of the American producers have been (1) the use of incubators and brooder houses for rearing, and (2) shielding the birds from the two main sources of infection, namely, fowls and contaminated land. Incubators and brooder houses and eggs used for hatching should be kept scrupulously clean, an efficient antiseptic being used to disinfect them. For this purpose Schlotthauer and Essex used formalin for some of their experiments; for others they washed the eggs they used in a 1 in 1000 solution of corrosive sublimate in 95 per cent. alcohol, and steam-cleaned their brooders before putting chicks into them. In order to test whether the mother turkey could transmit the disease to her chicks through her eggs direct, Theobald Smith sterilized incubators by washing them with a 0.5 per cent. solution of corrosive sublimate (a very poisonous substance which must be used with great care), and he also washed the eggs in this for 30 seconds. He then found that no blackhead resulted and no one has yet been able to disprove his conclusion that the infection cannot be transmitted directly from mother to chick through the turkey's egg. Until it has been conclusively shown that this can occur, we must assume that the young chick always becomes infected either from contaminated land or from hens with which it comes into contact. The use of incubators and brooder houses thus prevents the youngest chicks from acquiring any infection from these sources, and should prevent the disease occurring until the chicks are allowed to run upon the land. It is then that they are more difficult to control and further precautions must be taken against the two main sources of infection.

Fowls may give the disease to turkey chicks in two ways. They often acquire the disease when they are chicks, but, *unlike young turkey chicks, which so often succumb to it,*

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they usually recover quickly but continue for an indefinite time, even when they are full-grown birds, to pass out the infection with their excreta. They become, in other words, what are called "carriers" of the disease. If these carrier hens are used, as in England they often are used, as brooder hens to hatch and bring up the young turkey chicks, they infect these with blackhead by contaminating the land and therefore the food of the turkey chicks. Even turkey chicks brought up in incubators and brooder houses may so catch the disease from fowls, if they are allowed to come into contact with them. They may also catch it in the same way from older turkeys that have had blackhead, but it is unusual for older turkeys to give it to chicks unless they are acutely ill and passing out the characteristic sulphur-coloured scour. In any event, the only sound practice is to keep all young turkey chicks away from other turkeys and from fowls, at least until they are three months or so old. If they catch the disease then they have a better chance to survive, being older and stronger.

It follows also that if the infection can be picked up in this way from land contaminated by turkey or hen droppings, it may be carried from place to place on the boots or hands or utensils of farm workers. Miss Tallent, at Harper Adams College, suspected that an outbreak occurring in spite of very careful precautions, was due to the introduction of the infection on the boots of the attendants. Turkey runs should therefore be so made that the attendant need never enter them. There is no sound evidence as yet that flies and lice can transmit the infection, nor that other birds suffer from it, except ruffed grouse and quail.

Fowls and older turkeys, and indeed other birds, may transmit the disease in another way, namely, by means of the eggs of the roundworm *Heterakis*, which they often harbour in the two blind outgrowths of their intestines called the caeca. It has been shown that these eggs, provided they have reached the stage of development at which the young worm is visible inside them, can give the disease to fowl and turkey chicks, if they have come from worms inside birds that have had blackhead. Dosing the birds to remove some of these worms is, therefore, good practice. Everything that is done to maintain the birds in good health and to keep them shielded from these sources of infection is labour well expended. Young turkey chicks, for example,

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should be kept warm and dry and should receive plenty of fine-cut green foods to guard against leg weakness. Chopped hard-boiled eggs may be fed with sour milk to the young chicks, which may be removed to runs on clean pasture when 8-10 weeks old. They are then less likely to get the disease, most deaths occurring between the age of 3 weeks and 3 months, although older birds must not be regarded as immune.

It will now be evident why sick birds should be immediately isolated in a hospital and never returned to the flock, even if they recover. It will also be clear that it is better to use incubators instead of brooder hens for hatching, and properly cleaned brooder houses for the care of early chicks. A hot 10 per cent. solution of caustic soda helps to disinfect and removes grease and dirt. Washing and scrubbing with this may be followed by washing with 2 per cent. formalin or 5 per cent. carbolic acid. Birds should never be reared on land on which blackhead has once occurred until an interval of at least a year, or better, two years, has elapsed. Even if no blackhead has occurred it is better not to run young turkey chicks on the same land two years in succession. If land that has been used for rearing young chicks can be dressed with quicklime and ploughed up between seasons, there should be less risk of infection. All birds that die of the disease should be burnt with their droppings, everything with which they have been in contact being thoroughly sterilized.

The disease is caused by a minute protozoan called *Histomonas meleagridis*, which must be present before the disease can occur. The belief that damp and cold can cause it has no foundation, although such conditions may lower the resistance of the birds, or favour the development of the roundworms by which it can be transmitted. There is no evidence that the damage done by the roundworm to the caeca helps the parasite to invade the tissues. *Histomonas* invades the caeca first and then is carried by the blood to the liver and sometimes to other organs as well. (*Histomonas* is an interesting link between amoebæ like the one that causes amoebic dysentery in man and flagellates of the group to which the sleeping sickness parasite belongs.) When a bird that has died from blackhead is examined, one or both of the caeca will usually be found enlarged, with a thickened wall, or areas of thickening may be found upon it; it will usually be filled

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with a hard core and will show some ulceration. The liver will be covered with circular whitish or yellowish areas, sometimes with a slightly greenish tinge and marked with faint concentric rings, depressed below the rest of the surface of the liver. These vary in size from small spots to areas as big as a threepenny bit or even a sixpence. When the liver is extensively covered with these, there is little hope that the bird will recover, although it may last out until it is a good size and is always, of course, eatable if the liver is removed. The absence of these signs should not be regarded as proof of the absence of the disease, because it has been shown that the parasites may be present in areas in the cæca or liver so small that they cannot be seen with the naked eye; and from these the disease may subsequently develop.

No drug is known which will either prevent or cure blackhead. Tyzzer and others in America have tried without success the injection or oral administration of a variety of chemical substances, for some of which it has been claimed that they prevent or cure the disease. Among these are sulphur and ipecacuanha, which, if they do any good at all, seem only to help by evacuating the bowels. Tyzzer also tried emetine, tobacco dust, Mexican bitter bush, Bayer 205, quinine, turpentine, tartar emetic and various arsenical preparations. A good deal has been claimed for arsenical preparations, but Tyzzer's work does not justify the use of those which he tried. He found that arsenious acid by the mouth did no good and was poisonous to the birds; much the same was true when neoarsphenamine was injected into their veins or muscles, its toxicity preventing the use of a large enough dose. A 25 per cent. solution of tryparsamide in water injected into the vein enabled 66 per cent. of the birds 2-4 months old so treated to recover, provided—and this is a very important point—that it was given when the symptoms of the disease first appeared; but often the dose had to be repeated at short intervals. The drug is expensive, requires skilled administration, and the dose must be so carefully adjusted to the body weight of each individual bird that it is, in Tyzzer's opinion, no use as a practical means of treatment. Nor does it follow that the results of such a treatment in the field would be as good as those obtained in Tyzzer's laboratory. There seems, indeed, to be no reason for the employment of drugs at all when the American farmer has shown that mass production of turkeys for market is possible by proper management alone.

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Drbohlay's successful cultivation in the laboratory of the parasite causing the disease has very greatly helped our knowledge of the disease. It has enabled Tyzzer, for example, to study immunity to the disease. Tyzzer claims that by inoculating attenuated strains of these cultures into young turkeys under a year old he has been able to immunize them against blackhead for two months or so. They then lose their immunity, however, and all attempts to immunize turkeys a year or so old or older have failed. He points out that it would not be economically practicable thus to "vaccinate" turkeys on farms to protect them, because of the elaborate and expensive organization that would be required, but he has himself thus protected small flocks of thirty birds or so and reared them without blackhead on land that previously always gave them this disease. It would be rash to assume that methods of this kind will never be economically practicable, because our knowledge of the immunology of diseases caused by parasites (as distinct from that of diseases caused by bacteria, which is, of course, very highly developed) is as yet only beginning. For the present therefore the only sound method of dealing with blackhead is by efficient management.

What American farmers have done, the British farmer can also do, and if, after reading this article, he is still in doubt about what exactly should be done, advice is available for him free of charge from any of the Ministry's Advisory Officers.

A CHANGE FROM ROUGH GRAZING TO INTENSIVE METHODS OF FARMING IN EAST DEVON

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STATISTICS of English farming during recent years have shown that there has been a steady decline in the total acreage devoted to arable cultivation, and at the same time an increase in the acreage of permanent grass land, and particularly in rough grazng.

The output per acre from rough grazing must be small by comparison with the productivity of the same land under a more intensive system of management.

It is the more refreshing, therefore, to have contact with an individual whose farming operations are directed towards a greater production per acre from land scheduled as rough grazing. Such an individual is Mr. A. O. Morton-Moncrieff, who has attempted on an extensive scale the reclamation of neglected land. An account of his farm, and activities, forms the basis of this article.

The farm, "Highwood" by name, is situated mid-way between the market towns of Honiton and Hemyock, in the heart of East Devon. Good roads bound three sides of the farm, and their straightness, and the proximity of Hembury Fort, a one-time Roman stronghold, are suggestive of their origin. Many of the roads in the neighbourhood are flanked by "common-land" bearing the familiar vegetation of furze, bracken, heather, and wiry springy herbage which seems to characterize soils farmed as common-land. Since the Repeal of the Corn Laws, the enclosed land too, seems in many instances to have deteriorated till a herbage has resulted similar in character to the commons.

The type of farming practised in the district combines dairy farming and stock-rearing. Up to its purchase in 1929, "Highwood" was used mainly as an extensive run for store cattle and horses.

Soil Type.—A superficial examination of the land reveals a peaty soil, similar in type to that found in the Fen district. The accumulation of partly-decayed vegetable matter, black in colour and fibrous in texture, masks com-

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pletely the soil proper, by overlying the true soil to a varying depth. Two soil types predominate, the one derived from the Upper Greensand, the other composed of clay and flints. There is a marked difference in the extent of the peaty accumulation on the two types of soil, that above the clay and flints being as deep as 6-8 in. and that overlying the Upper Greensand extending to 2 in. only. On the Greensand formation, several of the fields that have been in arable cultivation since 1929 have to a great extent lost their peaty character and resemble more closely a typical Greensand soil. On the other hand, the soil formed of clay and flints more persistently retains its black colour and vegetable content.

Cost. —The farm, 334 acres in extent, including 59 acres of "covers," came into the market in 1929, and was purchased by the present owner for £2,750. The price included the "covers," valued at £500, and a new bungalow, valued at £700. The whole property was free from tithe charges. Before the property came on the market, £300 had been spent on rebuilding the road down to the buildings, and, in addition, a new brick piggery had been erected. Deducting the value of the timber and bungalow from the purchase price the land and buildings were purchased for approximately £5 per acre.

The productive capacity of the farm at that time can be gauged by the lowness of the cost, but even so, local opinion was that the farm would be uneconomic even at that figure.

The new owner was also of the opinion that his purchase might prove unremunerative if the existing farming system was continued. At the outset, therefore, he was faced with the problem of how to adapt the farm to a system which held out greater promise of financial remuneration. Monetary considerations, were, however, of only equal importance to a genuine desire on the part of the owner to increase production from land considered of little worth.

The Owner's Aim.—Two main lines of attacking the problem were open for choice: (a) to attempt to improve the quality and productivity of the herbage by tighter grazing and the carrying of a larger head of stock than previously, or (b) to plough the "rough grazing" and turn in part to arable cultivation.

The first method was vetoed by reason of the amount of undecayed vegetable matter above the soil proper, as the

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extent of any improvement of this type of herbage caused by the grazing and treading of stock would not have been commensurate with the expense involved.

Arable cultivation on the other hand, would encourage the decay of vegetable matter, and simultaneously allow the cashing of the accumulated fertility in the form of increased crop.

In addition, it was considered that the initial ploughing would be rendered easier if pigs were first folded over the land, and, at the same time, the pigs would provide themselves with a proportion of their food requirements.

The aim may be summed up by saying that pigs were to be kept for a dual purpose—first with the idea of facilitating a thorough breaking of the “mat” of vegetable matter, and secondly, for the economic production of bacon; pigs to be followed by the plough; arable crops to be grown as considered desirable; and finally reseeding with mixtures designed for four-year leys.

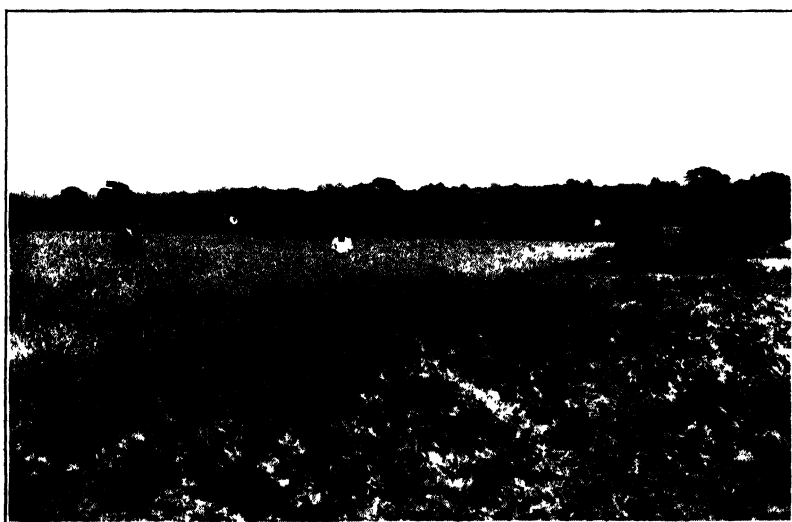
Preliminary Expenditure.—Before the above scheme was put into operation, certain necessary expenses were incurred. First, the provision of an adequate water supply in the fields became an essential to economic management of the live stock. A ram has been installed to provide water for large storage tanks, which, in turn, are connected by underground pipe-lines to concrete troughs in each field. The water level in every trough is controlled by a ball-valve. In addition, the pipe-lines are tapped at suitable intervals so that flexible piping may be connected and a water supply taken direct to the food mixing sheds and to the folding pens. During the summer the flexible pipes are run along the surface, whilst in winter they are covered to ploughing depth. Pig netting, movable pig shelters, and movable mixing sheds, were purchased as required.

A Rushton tractor was purchased for work on the arable land, and subsequently a Fordson tractor was acquired. Of the tractor-size implements the more important include a Ransome 3-furrow disc plough, a Muirson rotary cultivator plough, a Massey-Harris disc harrow, and a Wilder's pitch-pole harrow. The latest purchase has been a Massey-Harris power-driven binder. It is noteworthy that only one horse has been retained, and it does little other than “odd jobs.”

Reclamation of Land by Pigs.—It has been explained that under the system pigs were to be kept as a means to



FIG. 1. View, showing (on the left) field reclaimed in 1932 — note the clover, on the right — field in original condition (since ploughed for cropping)



Photos — Western Times

FIG. 2. Mr. A. O. Morton-Moncrieff and his son standing in a thick crop of Golden Rain Oats No. 2, the first crop after breaking land similar to that in the foreground.



FIG. 3 Disc ploughing with Rushton tractor.

Photo : Western Times

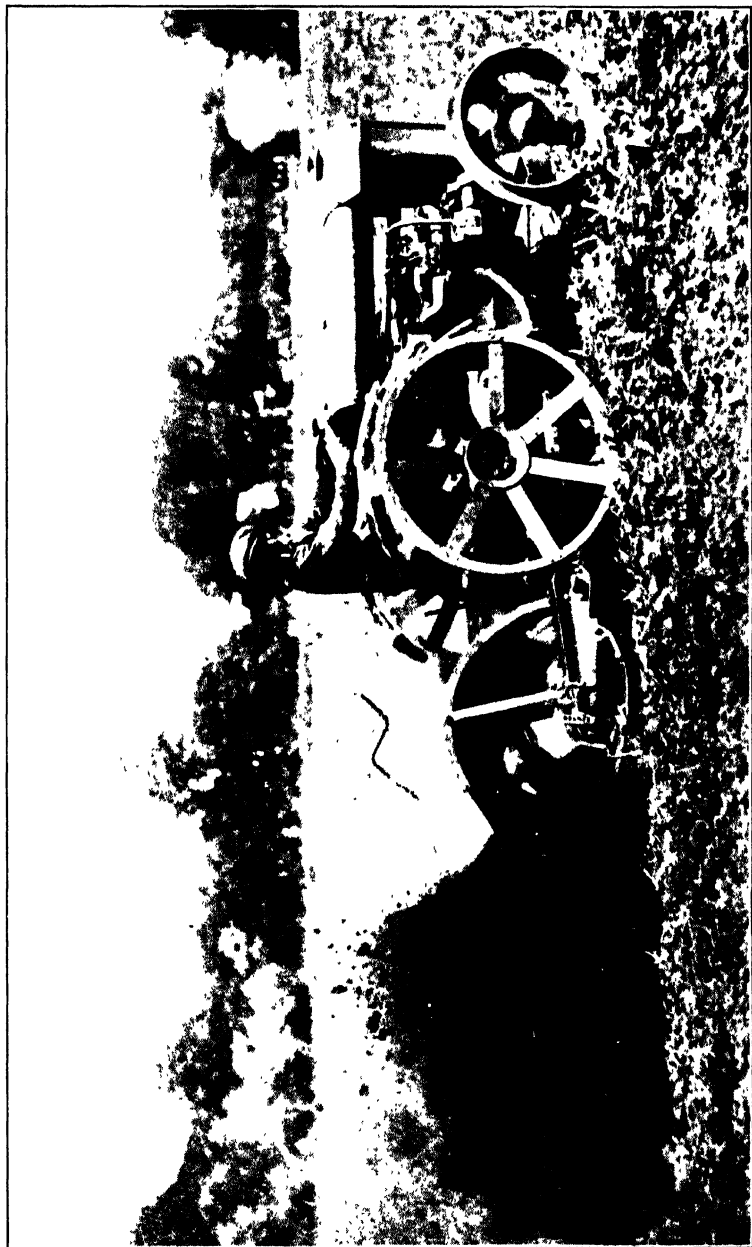


FIG. 4 Preparing seed-bed with Rotary Cultivator plough

Photo · Corbyright

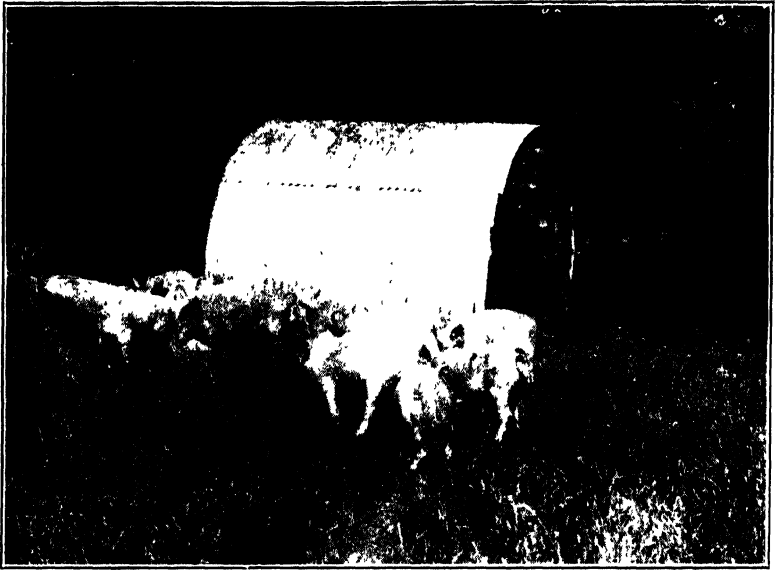


FIG. 5 Feeding time for the pigs

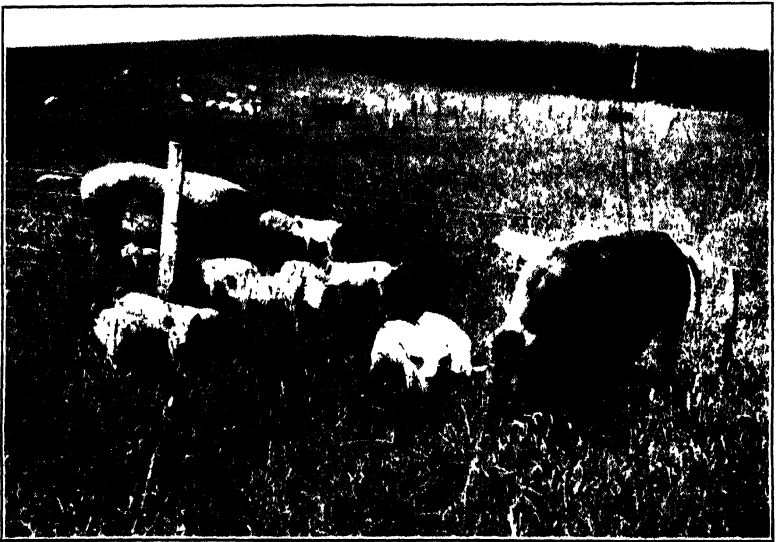


FIG. 6 Sows with litters on new pastures.

Photos : Western Times

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an end. It was hoped that the pigs would prove helpful in breaking down the "mat," and that the following crops would be the better because of the pig-folding. This has proved to be so in practice, as corn crops grown on "folded" land have yielded better than those grown on land kept free from stock.

It has been the custom to maintain the whole of the pig population out of doors with the exception of those weighing more than 140-150 lb. live weight. On reaching this weight the pigs are drafted into the fattening pens.

None of the pigs is rung, since ringing would nullify one of the purposes for which they are maintained. It is mainly during the winter months that the live stock are confined to the rough grazing, as during the wetter periods of the year the rooting and poaching effects are more speedily produced.

Tillage Operations.—When tillage operations first commenced the unsuitability of the orthodox mould-board plough became apparent, as it proved impossible to keep the plough into its work. After a trial, the purchase was made of a disc plough, and a rotary cultivator plough, as it was shown that these implements could work successfully on this class of ground. The actions of the two ploughs are depicted in the illustrations.

The rotary plough is brought into action following the folding of the ground. The rotary vanes cut into the soil every four or six inches of forward movement of the machine according to the gear engaged on the tractor. Depth of working is controlled by a lever within easy reach of the tractor driver. The objects of cultivating first with this implement are, to level the soil surface, left in a rough, uneven state by the folding, and to assist further in the tearing apart of the "mat" to a depth of 4 in. The land is then ploughed with the disc plough to a depth of 7-10 in. These preliminary cultural operations are completed when possible during the autumn and the land left undisturbed till the following spring.

The importance of autumn cultivation on this farm cannot be over-emphasized, as it has definitely been established that size of crop is affected by the time of breaking of the turf. The disintegration of the "mat" and the establishment of a more intimate connexion between the true soil and the peaty material is more easily achieved by the

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preparation of the ground during the autumn. It has been evident on occasions that when the initial ploughing has not thoroughly broken up the peaty material partial crop failure has resulted.

In the following spring, the preparation of a good seed-bed is achieved by a single cultivation with the rotary plough. A normal day's work consists of breaking down the furrow with the plough (named the "Chopper" because of its action) followed by drilling and dragging at the rate of five acres per day.

Occasionally the complete preparation of the seed-bed from ploughing to drilling is carried out during the spring, but, where possible, only those fields which have been cropped previously are treated in this manner. Where it is desirable to break land not previously folded, the same sequence of operations is maintained.

System of Cropping.—The farm, 334 acres in extent, includes 59 acres of "covers." The amount of land, therefore, available for agricultural development is 275 acres. By the summer of 1934 a total of 191 acres had been reclaimed, the major portion of this acreage through the agency of the plough.

The areas under the various crops in 1934 were as follows:—

Cereal crops	..	..	..	..	80 acres.
Roots	..	..	..	..	20 "
Fallow	..	..	..	..	12 "
New and reclaimed pastures	..	..	..	..	79 "
Rough grazing (for future treatment)	..	..	..	..	84 "
					275 acres.

"Highwood" is situated at an altitude of 800 feet above sea level. This altitude, in conjunction with other factors, constitutes a bar to freedom of cropping in so far as the common cereals are concerned. The accumulation of partly decayed vegetable matter, has, in addition, created a severe lime deficiency in the soil. On these two accounts, therefore, the superiority of the oat crop as the most suitable cereal was manifest. Till 1934, both winter and spring oats were grown, but in that year the whole of the acreage under oats was spring sown. The varieties most suitable for the soil and climate are Golden Rain II and Victory, although of the two the former has proved the more reliable. Heavy seedings of both varieties are given in order to counteract

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a tendency to coarseness, and a susceptibility to "lodging" encouraged by the high nitrogen content of the soil. On account of the altitude, ripening dates are approximately two weeks later than those of neighbouring valley crops.

The new oat, "Resistance," is being tried as to its suitability, both as a winter- and spring-sown variety. In the spring of 1934, 20 acres of barley were sown as an experiment, but results were unsatisfactory.

The root crops, consisting of mangolds, turnips, swedes, cabbages and kale, are consumed on the farm.

As suggested by a study of the 1934 acreages under the various crops, it was no part of Mr. Moncrieff's plan to turn to purely arable cultivation. It has been the aim rather to crop the land with cereals and roots, so long as bracken and heather existed, and whilst there was an excessive amount of peaty material in the soil.

Normally, the land is cropped with oats for two years after the turf is first broken and the second corn crop under-sown with a grass seeds mixture designed as a four years' ley. (It will be appreciated that under good management a pasture derived from such a mixture may be left down permanently.)

As more of the rough grazing comes under the plough it may be deemed advisable to extend the time between breaking and re-seeding. The method of utilization of the grass land is described later.

Manuring. - The analysis of soil samples taken from the fields have indicated that acid conditions are prevalent, and that both phosphates and potash are present in insufficient amounts for normal plant development.

The lime requirement of the soil varies between the limits of 1 and 4 tons per acre of burnt lime. The presence of acidity has doubtless been induced by the accumulation of peaty material and the absence of the nitrifying bacteria that normally assist in the breakdown of organic matter.

Since the removal of acidity by applications of lime, in addition to the necessary dressings of phosphatic and potassic manures, would have proved very costly, it was decided to experiment with the different fertilizers in order to discover a suitable mixture at a reasonable price. The oat crop is one that will flourish under acid conditions, so that liming is omitted for this crop. Mineral phosphates and 30 per cent. potash salts have proved the most suitable of

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the artificial fertilizers, and since 1930 have been used exclusively for the oats.

The standard mixture of artificials is mineral phosphates 4 cwt. per acre, 30 per cent. potash salts 2 cwt. per acre, and nitro-chalk applied as a top-dressing at the rate of 1 cwt. per acre.

Although the soil has a high organic content the nitrogenous manure is necessary to tide the plant over that period of the year when the land lies cold and nitrification is at a standstill.

The root crops receive a dressing of 4 cwt. mineral phosphate and 3 cwt. of 30 per cent. potash salts per acre, in addition to farm-yard manure and top dressings of nitro-chalk.

The Farm Live Stock.—Following the annual decrease in the acreage of rough grazing and the increase in new pastures, the productivity of the farm has improved enormously. It became evident that a class of stock other than pigs was required to deal effectively with herbage in excess of the pigs' requirements. Both store and fattening cattle are now a feature of the live stock of the farm. In 1934, 36 acres of grass land were mown for hay—this hay and a proportion of the roots being utilized for the winter feeding of the cattle.

In the pig department it is not the aim to breed pedigree stock but rather to breed, rear, and fatten pigs of a good commercial type. The pig population varies between 700 and 800, including 76 breeding sows of the Large White, Large Black, Saddleback and Lop Eared White breeds. Large White Yorkshire boars are maintained for stud purposes. The production per sow is two litters every thirteen months. In-pig sows are run together till fourteen days before farrowing. They are then brought back to the buildings and two days before farrowing are allowed separate pens.

When the litters are a week old, both sows and litters are drafted either on to the new pastures or the rough grazing. During the winter months the whole of the outdoor pig population is confined to the rough grazing, for two reasons—(1) the rooting and poaching effect desired on the un-reclaimed land is the more easily produced during the wetter periods of the year, and (2) damage would be done to the new pastures if they were heavily folded during the winter.

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Although none of the pigs is "rung," no rooting takes place on the new pastures during the summer months. This is attributable to the presence of 10 per cent. animal protein as well as minerals in the pig meal, and to the excellent quality and productivity of the grazing.

At 8-10 weeks old the litters are weaned and then grouped three litters together for folding purposes. The folding pens, therefore, are stocked with approximately 24 pigs, each pen being provided with an adequate shelter.

Feeding is carried out twice daily on a semi-wet system. Dry food is placed in the troughs and a little water poured over it. Every pen is provided with a fresh water supply, which is available at all times for the pigs. The daily consumption of food varies with the size of the pigs, but no pig receives more than $3\frac{1}{2}$ lb. of meal per day whilst outdoors.

On attaining to a live-weight of 140-150 lb. the pigs are drafted into the fattening pens, their initial weights at the commencement of the fattening period recorded, and thereafter weighing takes place once per week. On reaching bacon weights the pigs receive a maximum of $6\frac{1}{2}$ lb. of meal per head per day, and are despatched to the factory at approximately 11 score live weight at 7 months old. Grading returns have shown the advisability of restricting food consumption when feeding a ration such as is used, even at the expense of lengthening the fattening period.

The selection of gilts for breeding purposes is based upon three main considerations—a bacon conformation, a good and even udder development, and an economical live-weight increase for the amount of food consumed. The determination of the last point takes place in the fattening pen. The gilts that produce the best live-weight increase in relation to food consumed are retained for breeding purposes. The general health of the pig population is extremely good. This may be due, in part, to the extent of the land available, for constant moving of the folding pens ensures that the soil does not become "pig-sick." Although the farm is cold and bleak, on account of its high altitude, pigs suffering from tuberculosis or any other complaint are extremely rare. At 12 weeks old all pigs are treated for worms.

The Disposal of Crops and Stock.—The hay and roots are consumed on the farm. The whole of the hay and a proportion of the roots are fed to the cattle, whilst both the store pigs and pigs in the fattening pens receive a liberal

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allowance of green foods, especially during the winter months.

The oats find a ready sale to seed merchants, who re-distribute them to farmers as seed oats. Many farmers like to change their stock of seed grain as frequently as possible and show a preference for a sample coming from a poorer soil and grown at a higher altitude than their own farms. The seed oat sales are, therefore, very valuable to the owner, who accordingly takes great care that there shall be no cause for complaint and rigorously "rogues" the crops before harvest. Oat straw in excess of the stock requirements has found a ready sale. The average oat yield has been 55 bushels of grain and 25 cwt. of straw per acre.

The fat cattle are sold privately to the local butchers. Since the introduction of the Pig Marketing Scheme, Mr. Moncrieff has despatched all his bacon pigs under contract to the West Somerset Dairy and Bacon Company, and has received on the average a price between Grade B and Grade C.

Costs.—Careful records of all expenditure and income are kept, the farm accounts being audited annually by a chartered accountant. A few figures of costs may, therefore, be of interest.

(a) *Cultivations.*—Autumn cultivations are carried out at the rate of one acre per day. They include the breaking of the turf with the rotary plough, followed by deep ploughing with the disc plough. The cost per acre is covered by the following charges: 12 gal. of Shell Spark at 8*d.* per gal.=8*s.* one gal. lubricating oil at 3*s.* per gal.=3*s.*; man's wages at 6*s.* 3*d.* per day—giving a total of 17*s.* 3*d.* per acre for autumn cultivations. It has already been explained that spring cultivations are done at the rate of 5 acres per day. This includes the preparation of the seed-bed by the rotary plough, followed by the single operation of drilling and dragging. The cost is 3*s.* 6*d.* per acre, bringing the total cost of the cultural operations up to the completion of drilling to 20*s.* 9*d.* per acre. No allowance has been made for interest on capital or depreciation of machinery.

(b) *Manuring.*—Artificial manures for the 1934 crops were purchased at the following prices per ton: mineral phosphates 53*s.*, 30 per cent. potash salts 97*s.*, and nitro-chalk 150*s.* The cost of the standard dressing of artificials is, therefore, 4 cwt. mineral phosphate=10*s.* 7*d.*; 2 cwt.

ROUGH GRAZING TO INTENSIVE FARMING

30 per cent. potash salts = 9s. 8d.; 1 cwt. nitro-chalk = 7s. 6d., making the total 27s. 9d. per acre. Allowing 3s. per acre to cover the cost of the application in two dressings, and the mixing of phosphates with potash, the total cost of the manuring is 30s. 9d. per acre.

(c) *Valuations*.—The amount and value of stock on March 31, 1934, was as follows: 1 cart horse £25, 17 cattle £253, and 644 pigs £2,481 10s., giving a total valuation of live stock of £2,759 10s.

The dead stock, including implements, machinery, pig shelters, troughs and netting, but excluding permanent buildings, was £1,330.

The available farm acreage for productive purposes is 275 acres; the live stock, therefore, is in the proportion of £10 and the dead stock £5 per acre.

(d) *Labour Costs*.—Eight men are employed full-time on the farm. Mr. Moncrieff realizes that his wages bill is greater than need be the case. The farm, however, was in an extremely dilapidated condition when he assumed the ownership, and he has incurred heavy labour expenses in unproductive but desirable improvements. In addition, he has added extensively to the buildings by increasing the accommodation of the fattening pens for pigs and cattle, and the erection of a large Dutch barn, the labour entailed by this work being provided by his own staff.

The labour is divided in the following manner: One man full time with the fattening pigs, with assistance (during feeding time) from the man in charge of the cattle; one man in charge of the outdoor pigs, with assistance from two men during feeding hours; one man full time with the tractor; one carter; and a spare man for "odd jobs." In this way there are three men with specialized positions receiving help at feeding hours from the remainder of the staff who are employed normally on general work.

The Effect of the Pig-Marketing Scheme.—The owner is an ardent supporter of the Pig Marketing Scheme, and has supplied the following figures in justification of his support:—

Between October 1, 1932, and September 30, 1933, he sold 433 pigs at an average price of £4 per pig. His production, between the same dates the following year, was 665 pigs sold for £4 7s. 1d. per pig. This difference in price of 7s. 1d. per pig, or an annual increase in income of £235

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on a production of 665 pigs, he attributes to the effect of the Scheme, as the cost per ton of his pig rations was the same during both years.

In addition, he maintains that a pig producer is given encouragement to expand his business under the protection of the Scheme, whilst without it the profitable production of bacon pigs becomes extremely hazardous.

Conclusions.—The writer's general impression of the farm, gained after an extensive knowledge of "Highwood" during the last three years, may be summarized as follows:—

Since the change in ownership of the farm, a remarkable transformation has taken place. Crop production per acre has increased by leaps and bounds. Costs of arable cultivation have been reduced to a minimum by the purchase and use of implements specially designed for the task. On the other hand, costs per acre for artificial fertilizers have been higher than those for cultivation. The necessity for this expense has been abundantly proved by experiment. Coincident with an annual increase in the acreage of new pasture has been an increase in the head of horned stock. Opportunities have been seized as they were offered, as, for instance, the marketing of oats for seed purposes. Modifications in the system will be necessary from time to time to meet changing circumstances, and these will doubtless be made.

Finally, the owner has, by his endeavours, clearly indicated the potential possibilities of land similar to his own.

Mr. Moncrieff sums up the situation as follows: "Though, up to the present, I have not made a financial success of farming, neither have the majority during the last few years, but, given equal opportunity, I will be as successful as many."

THE BOTANICAL COMPOSITION OF SOME RECENTLY-SEEDED WILTSHIRE PASTURE

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OTHER things being equal, the botanical composition of a recently-seeded pasture should accurately reflect the composition of the seeds mixture used. In practice, however, the complex of environmental factors operates in such a way that certain species are favoured at the expense of others, so that the actual composition of a pasture may bear no close relation to the composition of the seeds mixture used. Local variations in climate, soil conditions and biological factors are of sufficient magnitude to necessitate the laying down of seeds mixture trials in various localities. Only in this way can the value of a seeds mixture in any particular district be assessed.

The purpose of this paper is to present the preliminary results of seeds-mixture trials laid down in Wiltshire in 1930 and 1931. The observations recorded here were made in August, 1933, so that they can be taken as referring to the various plots at the beginning of their history as permanent pasture. Trials were laid down at three centres, ten or eleven different seeds mixtures being used in each instance. In all, 31 plots were laid down, but for various reasons the results of only 22 are presented and discussed here. The soils were, at all centres, loams overlying chalk with flints, and the area is one in which the incidence of summer drought is probably the chief factor that, combined with rapid soil drainage, militates against the formation of first-class pastures. The seed was sown under a nurse crop of spring corn, and since the seeding year hay crops have been taken each summer. The taking of three successive hay crops from the plots laid down in 1930 and of two from those laid down in 1931 has doubtless had an adverse effect upon sward formation.

As mentioned earlier, we can look upon the observation as referring to the various plots at the beginning of their history as permanent pastures. It is of interest to see to what extent variations in species and strain of species sown have affected the composition of the experimental areas, and to consider the potentialities of the various plots.

BOTANICAL COMPOSITION OF SOME WILTS PASTURE

Composition of Seeds Mixtures Used.—The composition of the seeds mixture used is given in Table I, the table showing lb. per acre of each species sown. The numbers 1 to 10 along the top of the table show the number of the seeds mixture, and the various plots will in future be referred to by the use of the appropriate numbers.

TABLE I.
COMPOSITION OF SEEDS MIXTURES USED
(in lb. of Seed Sown per Acre).

	1	2	3	4	5	6	7	9	10
Perennial Rye-Grass	16	16	16	16	16	16	10	12	—
Cocksfoot ..	D10	D10	S10	N10	—	—	D10	—	I16
Timothy ..	4	4	4	4	4	4	4	—	I 8
Rough-Stalked Meadow-Grass ..	1	1	1	1	3	1	1	3	I
Red Fescue ..	—	—	—	—	—	—	—	—	I 4
Meadow Fescue ..	—	—	—	—	—	10	—	—	—
Crested Dogtail ..	—	—	—	—	—	—	3	—	—
Italian Rye-Grass ..	—	—	—	—	—	—	—	—	4
Wild White Clover	1	1	1	1	1	1	1	2	1
Dorset Marl Red Clover ..	6	—	6	6	6	6	6	—	6
Late-flowering Red Clover ..	—	6	—	—	—	—	—	—	—
Trefoil ..	1	1	1	1	1	1	1	—	1

D = Danish. S = Svalöf. N = New Zealand. I = Indigenous.

Seeds mixtures 1-4 are all of the Cockle Park type, with varying strains of Cocksfoot and Red Clover. In numbers 5 and 6 the Cocksfoot is omitted and the Rough-Stalked Meadow-Grass increased to 3 lb. in 5, whilst in 6, 10 lb. Meadow Fescue are substituted for the Cocksfoot; in 7, part of the Perennial Rye-Grass is replaced by Crested Dogtail. No. 9 is a simple grazing mixture. No. 10, with no Perennial Rye-Grass, contains 4 lb. of Italian Rye-Grass, whilst the Cocksfoot and Timothy are indigenous strains and the seeding of each is increased, and 4 lb. of Indigenous Red Fescue are also included.

Table II shows the composition of the experimental plots, the percentage of ground covered by each species being given. Weeds and grasses not sown are included together except at Centre 2 (sown 1931), where the Bent has been estimated separately. The small amounts of Red Clover have been neglected.

Centre I: (Sown 1930).—At Centre I (sown 1930) the composition of the various seeds mixtures used is fairly accurately reflected in the composition of the sward, although both Perennial Rye-Grass and Timothy are rather low considering the rate of seeding. The four Cockle Park

BOTANICAL COMPOSITION OF SOME WILTS PASTURE

TABLE II.

COMPOSITION OF EXPERIMENTAL PASTURE PLOTS

Showing % Ground Covered by each Species.

Centre 1 (Sown 1930).	1	2	3	4	5	6	7	9	10
Perennial Rye-Grass	12	15	12	10	14	10	7	18	—
Cocksfoot	32	31	28	31	—	—	34	—	—
Timothy	11	10	10	9	10	17	7	—	—
Rough-Stalked									
Meadow-Grass ..	10	9	9	14	25	8	15	9	—
Meadow Fescue ..	—	—	—	—	—	14	—	—	—
Crested Dogstail ..	—	—	—	—	—	—	4	—	—
Wild White Clover ..	35	33	37	29	43	43	25	70	—
Weeds and Grasses									
not sown	Tr.	2	Tr.	1	Tr.	Tr.	1	3	—
Bare Space	Tr.	Tr.	4	6	8	8	7	0	—
Centre 2 (Sown 1931).									
Perennial Rye-Grass	—	Tr.	Tr.	Tr.	—	—	—	25	—
Cocksfoot	—	42	46	40	—	—	—	—	53
Timothy	—	Tr.	Tr.	Tr.	—	—	—	—	Tr.
Rough-Stalked									
Meadow-Grass ..	—	23	13	18	—	—	—	15	10
Red Fescue	—	—	—	—	—	—	—	—	18
Italian Rye-Grass ..	—	—	—	—	—	—	—	—	Tr.
Wild White Clover ..	—	16	18	20	—	—	—	27	12
Bent Grass	—	18	22	19	—	—	—	29	4
Weeds and Grasses									
not sown, other									
than Bent	—	1	1	1	—	—	—	1	1
Bare Space	—	Tr.	Tr.	2	—	—	—	3	2
Centre 3 (Sown 1931).									
Perennial Rye-Grass	10	13	11	14	11	15	14	18	—
Cocksfoot	38	41	38	37	—	—	41	—	37
Timothy	6	4	5	4	16	4	Tr.	—	9
Rough-Stalked									
Meadow-Grass ..	8	3	7	6	43	13	8	15	5
Meadow Fescue ..	—	—	—	—	—	32	—	—	—
Red Fescue	—	—	—	—	—	—	—	—	11
Crested Dogstail ..	—	—	—	—	—	—	5	—	—
Italian Rye-Grass ..	—	—	—	—	—	—	—	—	10
Wild White Clover ..	29	33	30	32	28	23	26	66	27
Weeds and Grasses									
not sown	2	1	1	1	2	1	1	1	1
Bare Space	7	5	8	6	Tr.	12	5	0	Tr.

(Tr. = Trace.)

mixtures, containing varying strains of Cocksfoot and Red Clover have given four plots with a similar composition. The omission of Cocksfoot and its substitution by an extra 2 lb. of Rough-Stalked Meadow-Grass has not only increased the amount of this latter grass but has allowed a better development of the Wild White Clover, which now reaches 43 per cent. The substitution of Meadow Fescue for Cocksfoot in Plot 6 has resulted in the maintenance of the White Clover at the higher level of 43 per cent. A good stand of

BOTANICAL COMPOSITION OF SOME WILTS PASTURE

Meadow Fescue has been obtained, but in amount this does not equal the Cocksfoot on Plots 1-4, but there is here a better development of Timothy. The examination of all the plots conveyed the impression that at this centre the Timothy was retarded in its development by the large amount of Cocksfoot present. The increase in amount of bare space in Plots 5 and 6 where Cocksfoot is omitted, leaves these plots rather more subject to invasion by weeds and inferior grasses, unless the bottom grasses and White Clover present succeed in rapidly covering the bare space. The reduction of Perennial Rye-Grass to 10 lb. and the addition of 3 lb. of Crested Dogtail has had little effect beyond altering the relative amounts of these two grasses. The simple grazing mixture (No. 9) has given by far the best cover, but the Wild White Clover is probably here rather excessive in amount.

Centre 2: (*Sown 1931*).—The data presented here refer only to five plots, but in none of these does the composition of the sward bear a close relation to the seeds mixture used. In the three Cockle Park mixtures Perennial Rye-Grass and Timothy have failed to establish themselves. Cocksfoot in all three shows a good development as does the Rough-Stalked Meadow-Grass, but this falls to a rather lower level in No. 3. In these three plots, as in No. 9, a considerable amount of Bent Grass is present. Presumably the failure of Timothy and Rye-Grass have allowed invasion by Bent. In these three plots (2, 3 and 4) an increase in the Wild White Clover above its present level would constitute an improvement in the turf. The simple grazing mixture has not prevented the invasion by Bent. This is the only plot with a good development of Rye-Grass. Both Rough-Stalked Meadow-Grass and Wild White Clover are disappointing in view of the heavy seeding, 3 lb. of the former and 2 lb. of the latter being used. Plot 10 is by far the most interesting of the series. Only a trace of Italian Rye-Grass has persisted, whilst the increased seeding rate of indigenous Timothy has not resulted in a better development of this grass. The increased amount of Cocksfoot used is reflected in the 53 per cent. of ground covered by this species compared with an average of 43 per cent. for the three Cockle Park mixtures. This is the only plot on which Bent has not succeeded in establishing itself in any appreciable amount. Its place here is taken by the

BOTANICAL COMPOSITION OF SOME WILTS PASTURE

indigenous Red Fescue, of which 4 lb. was included in the mixture used for this plot.

The position in respect of the Fine-Leaved Fescues is summarized in the Ministry's Bulletin* "... the indigenous Fine-Leaved Fescues (especially Red Fescue) are in the absence of anything better valuable bottom grasses. On the majority of soils, however, no appreciable benefits follow the use of commercial seed of these fescues in mixtures." In this trial, the mixture containing indigenous Red Fescue has been more effective than any other mixture used in forming a good sward. The Red Fescue appears to have controlled the Bent, which has established itself on the other plots, being favoured of course by the almost complete failure of Timothy and Perennial Rye-Grass (except in No. 9). The Red Fescue has formed an intimate association with the Wild White Clover, and this plot is the only one of the series having a really good bottom. The results suggest that indigenous Red Fescue is worthy of an extended trial in areas where establishment of pastures with a good bottom presents difficulties, especially in localities where soil drought militates against the formation of a good sward when seeds mixtures of the usual type are employed.

Centre 3: (*Sown 1931*).—Again the four Cockle Park mixtures have all given similar results, but the amounts of both Timothy and Rough-Stalked Meadow-Grass are disappointing. Here again the Timothy suffered from the competition of the Cocksfoot. When Cocksfoot is omitted and the Rough-Stalked Meadow-Grass is increased to 3 lb., not only is the amount of the Meadow-Grass increased but a better development of Timothy has resulted, 16 per cent. of the ground being occupied by this grass. The substitution of Cocksfoot by Meadow Fescue gave a good stand of the Fescue but the Timothy is here depressed to a low level again, and the Wild White Clover shows a slight depression also. Here, too, bare space has risen to the level of 12 per cent. leaving the plot more subject to invasion by weeds. The reduction of Perennial Rye-Grass to 10 lb. and the inclusion of 3 lb. of Crested Dogtail have produced no striking change in the composition of the turf. The simple grazing mixture has given a remarkable development of Wild White Clover, which here reaches the high level of

* Ministry of Agriculture and Fisheries: Bulletin No. 3, The Improvement of Grass Land, 1933.

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66 per cent. There is here a good cover with weeds and bare space is at a minimum. Plot 10 containing indigenous Red Fescue is again very interesting. The sown Italian Rye-Grass has persisted well here, and it will be interesting to see which of the other species replaces the Italian Rye-Grass as this dies out. Timothy and Rough-Stalked Meadow-Grass are disappointing, especially in view of the heavy seeding (8 lb. per acre) of the former. The presence of indigenous Red Fescue has again resulted in the production of a good bottom, the plot being better in this respect than any of the others. In this trial, the best cover has been produced on Plots 5, 9, and 10, in all of which the amount of "bottom" plants, either grasses or clovers, is in excess of that in the Cockle Park mixtures.

As a result of these preliminary observations certain tentative conclusions can be drawn. Owing to the fact that the plots have been hayed each year the simple grazing mixture has not had a fair trial. The results at Centre 1 indicate the value of Cocksfoot under ordinary types of management. Both absence of Cocksfoot and reduction of Perennial Rye-Grass have resulted in an increase in the amount of bare space to a level undesirable if weeds are to be kept out, unless management and manuring are such that the spread of desirable species is encouraged. At Centre 2, the production of a good turf, reasonably free from Bent, has been accomplished only with the mixture containing indigenous Red Fescue. Here, with a comparative failure of Timothy and Rye-Grass, all the other plots have been invaded by Bent, which is now present in undesirable amounts. At Centre 3 also the use of indigenous Red Fescue in conjunction with other indigenous strains of grasses has given a good close turf. Here the best cover is produced by mixtures Nos. 10, 9 and 5, which, as already indicated, all contain a greater amount of "bottom" plants than is usual. The results indicate the desirability of increasing somewhat the amount of bottom grasses. Of the bottom grasses available the value of Red Fescue has been demonstrated, if only for its ability to control Bent grass. Of the various Cockle Park mixtures tried no suggestion was obtained of the superiority of one strain of Cocksfoot over another.

It is suggested that indigenous Red Fescue is worthy of an extended trial both in mixtures of the type of 10, containing Italian Rye-Grass but no Perennial Rye-Grass, and

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also in conjunction with the Cockle Park type of mixture. Further observations on these plots, extending over a number of years, are necessary before it will be possible to confirm and amplify the tentative conclusions that have been drawn.

Messrs. W. Price and L. D. C. McLees, of the Wiltshire County Council Agricultural Education Department, have been responsible for laying down the trials, the preliminary results of which have been presented here. It is a pleasure to acknowledge the permission accorded me to publish the data and my sincere thanks are due to them for their assistance in the work. This work was carried out whilst the writer was associated with the Department of Agriculture, The University, Bristol.

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Milk Marketing Scheme.—*Pool Prices for April, 1935.*
—The wholesale “liquid” price during April was 1s. 4d. per gallon in all regions, the same as in March. Pool prices and rates of producer-retailers’ contributions for the month are given below, with comparative figures for the preceding month, and for the month of April, 1934, when the regional liquid price was 1s. 1d. per gallon in the south-eastern region and 1s. per gallon in all other regions:—

Region	Pool Price (d. per gal.)			Producer-Retailers’ Contributions (d. per gal.)		
	April 1935	March 1935	April 1934	April 1935	March 1935	April 1934
Northern ..	12½	13	10½	3½	2½	1½
North-Western ..	12	12½	10½	3½	2½	1½
Eastern ..	12½	13½	10½	3½	2½	1½
East Midland ..	12	13	10½	3½	2½	1½
West Midland ..	11½	12½	10½	3½	2½	1½
North Wales ..	11½	12½	10½	3½	2½	1½
South Wales ..	12½	13	10½	3½	2½	1½
Southern ..	12½	13½	10½	3½	2½	1½
Mid-Western ..	11½	12½	10½	3½	3½	1½
Far-Western ..	12	12½	10½	3½	3½	1½
South-Eastern ..	12½	13½	11½	3½	2½	1½
Unweighted Average	12.09	12.91	10.64	3.56	2.76	1.34

Producer-retailers who did not sell milk by wholesale during the month, otherwise than on contracts carrying level delivery premiums, were credited with a level delivery premium of ½d. per gallon.

Quantities of Milk Sold during April.—Sales of milk during April as estimated by the Milk Marketing Board were as follows:—

	April, 1935. (estimated.)	April, 1934.
Contract Liquid Sales	45,772,888 gal.	43,647,092 gal.
„ Manufacturing Sales	30,092,511 „	18,037,154 „
Total Contract Sales	75,865,399 „	61,684,246 „
Percentage Liquid Sales	60.3	70.8
„ Manufacturing Sales	39.7	29.2

The average realization price of manufacturing milk during April, 1935, was 5.20d. per gallon compared with 6.23d. per gallon in March. Milk manufactured into cheese by farmhouse cheesemakers showed a further increase from 286,899 gal. in March to 1,541,576 gal. in April, 1935, compared with 2,492,660 gal. in April, 1934.

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Price of Milk for Factory Cheese Manufacture.—Reference was made in the May JOURNAL (p. 156) to the arbitration on the question of the price of milk for factory cheese manufacture. An agreement has been reached between the Milk Marketing Board and the National Association of Creamery Proprietors representing the manufacturers, for a revision of the method of calculating the price, on lines suggested by the arbitrator, the Rt. Hon. Edward Shortt, K.C. The effect of the agreement is that during the months April to July, 1935, the price will be based on the average price of finest white New Zealand cheese, while for August and September it will be based, as heretofore, on the average prices of finest white New Zealand cheese and finest white Canadian cheese, but excluding, as regards Canadian, exceptional prices and prices for old cheese, and including new season's make.

Elections of Board Members and Annual General Meeting.—Elections of regional members of the Milk Marketing Board will be held on June 1 in four regions. The Board's second Annual General Meeting has been fixed for Thursday, June 6.

Pigs and Bacon Marketing Schemes.—*Pig Prices for May.*—The basic price, i.e., the price of the Class 1 Grade C pig, for the month of May, was 10s. 11d. per score compared with 11s. in April; this price is exclusive of the curers' contribution of 1d. per score towards insurance. Curers also contribute 2d. per score on every pig delivered and accepted during the year 1935 (except pigs delivered under Disease Infected Area contracts) towards the fund for bonus payments on pigs delivered during the first four months of the year.

Supplementary Contracts.—The number of pigs contracted for delivery on the further forms of supplementary contracts to which reference was made in the JOURNAL for April, 1935 (p. 49), was approximately 58,000, and thus fell considerably short of the number of 240,000 required for delivery in the period May to December, 1935.

Amendment of the Pigs Marketing Scheme.—The Minister and the Secretary of State for Scotland have appointed Mr. N. L. Macaskie, K.C., to hold a public inquiry into objections made with respect to the amendments of the Pigs Marketing Scheme that were recently submitted by the Pigs Board. The inquiry will commence at 10.30 a.m. on

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Thursday, June 13, in the Council Chamber, Middlesex Guildhall, Westminster, S.W.1.

Bacon Development Scheme.—The Pigs and Bacon Marketing Boards have submitted to the Minister of Agriculture and Fisheries and the Secretary of State for Scotland a revised scheme under the Agricultural Marketing Act, 1933, for the establishment of a Development Board for the bacon industry. Accordingly, no further action will be taken on the scheme previously submitted.

Copies of the revised scheme may be obtained from the Pigs Marketing Board at Thames House, Millbank, London, S.W.1, and 124, St. Vincent Street, Glasgow, C.2, or from the Bacon Marketing Board, Thames House, Millbank, London, S.W.1, and 105, St. Vincent Street, Glasgow, C.2; copies may be inspected at any of these addresses during normal office hours.

Objections and representations with respect to the scheme should be made to the Minister of Agriculture and Fisheries and the Secretary of State for Scotland, and addressed to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, or the Under-Secretary of State for Scotland, Scottish Office, Whitehall, S.W.1, or the Secretary, Department of Agriculture for Scotland, York Buildings, Queen Street, Edinburgh, *so as to reach them not later than June 29, 1935*; objections received after that date will not be considered. Any such objections or representations must be made in writing, and as regards objections, the ground of objection must be stated.

Hops Marketing Scheme.—The Hops Marketing Board announce that the producers' annual quotas of the 1935 crop will be 100 per cent. of the basic quota. The interchange of annual quotas will be allowed up to and including October 15, 1935.

Regulation of Imports: Processed Milks.—In the October, 1934, issue of this JOURNAL (pp. 676-677) there appeared a summary of the arrangements made for the regulation of imports of processed milks from foreign countries and the Irish Free State during the concluding months of 1934. The rates of reduction therein mentioned, namely, 30 per cent. on condensed milk (whole and skimmed), 35 per cent. on cream, and 25 per cent. on milk powder, imported from the principal foreign supplying countries, and 15 per cent. on condensed milks and 17½ per cent. on cream imported from

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the Free State, were subsequently continued for the first quarter of 1935. Proposals have now been made for the following percentage reductions in imports from the principal foreign supplying countries during the second and third quarters of 1935 (and the fourth quarter for cream), the reductions being based on imports during the corresponding months of the year previous to the introduction of import regulation, namely, June, 1932, to May, 1933:—

	<i>April to June.</i>		<i>July to September.</i>		<i>October to December.</i>
	%		%		%
Condensed whole milk ..	35	..	40	..	*
Condensed skimmed milk ..	40	..	40	..	*
Milk powder	30	..	35	..	*
Cream	40	..	45	..	50

* No proposal yet made.

Foreign countries with smaller interests in the market have been asked to observe a standstill in their supplies. As regards imports of condensed milks and cream from the Irish Free State, proposals have been made for reductions half as great as those applied to imports from the main foreign supplying countries during the second and third quarters of the year, based on imports in the corresponding quarters of 1933.

Milk Act, 1934.—Advances amounting to £975,598 have to date been made to the Milk Marketing Board under Section 1 of this Act in respect of milk used for manufacture (excluding milk manufactured by the Board itself or milk used for cheese-making on farms). These payments relate to milk produced and manufactured in the 12 months ended March 31 last, and although the details given below are not complete, supplementary claims are not likely to alter materially the relative proportions of milk used for the various products:—

Gallonage.

1934-5	Butter	Cheese	Milk Powder	Con- densed Milk for Export	Tinned Cream	All Products
Summer period (Apr 1 to Sept.)	27,537,792	42,075,863	5,394,420	4,311,130	—	79,319,205
Winter period... (Oct. to March)	28,503,954	32,606,889	3,988,770	2,789,498	2,717,724	70,606,835
Totals ...	56,041,746	74,682,752	9,383,190	7,100,628	2,717,724	149,926,040
Percentage ...	37	50	6	5	2	100

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Advances.

1934-5	Butter	Cheese	Milk Powder	Con- densed Milk for Export	Tinned Cream	All Products
	£	£	£	£	£	£
Summer period (April to Sept.)	152,631	238,235	11,238	24,186	—	426,290
Winter period... (Oct. to March)	228,427	262,703	24,930	21,924	11,324	549,308
Totals ...	381,058	500,938	36,168	46,110	11,324	975,598
Percentage ...	39	51	4	5	1	100

Rates of Advances.

(d. per gal.)

Month	Butter	Cheese	Milk Powder	Con- densed Milk for Export	Tinned Cream	Standard Price
1934						
April ...	1'5	1'5	0'5	1'5	—	} 5
May ...	1'5	1'5	0'5	1'5	—	
June ...	1'5	1'5	0'5	1'5	—	
July ...	1'25	1'25	0'5	1'25	—	
August...	1	1	0'5	1	—	
September	1	1	0'5	1	—	} 6
October	2'28	2'28	1'5	2	1	
November	1'96	1'96	1'5	1'96	1	
December	1'75	1'75	1'5	1'75	1	
1935						
January	2'07	2'07	1'5	2	1	} 6
February	1'77	1'77	1'5	1'77	1	
March ...	1'81	1'81	1'5	1'81	1	

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4·26d. per lb. for the month of May, 1935.

Nutritional Survey.—The aim and nature of this scheme, which is supplementary to the Milk in Schools Scheme, were outlined in the April issue. A first medical examination has been made and particulars recorded of 1,201 children in 5 Luton schools and of 1,187 children in 7

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schools in Wolverhampton. Test centres are also being established at Burton-on-Trent and Renfrew, and further centres, one in England and one in Wales, are contemplated. The Milk Marketing Board are well satisfied with the progress of this survey and in particular with the willingness of parents to co-operate.

Publicity and Propaganda.—A further scheme under Section 11 of the Milk Act for increasing the demand for milk has been submitted by the Board. Estimated to cost £60,000, the scheme comprises a press and poster advertising campaign during the summer months. This will be supplemented by a campaign amongst retail distributors to encourage shop and roundsmen's displays supported by recipe booklets and other literature. A press editorial service will also be arranged, and other advertising media are in contemplation. The campaign will be carefully interlocked with the propaganda work already being carried out by the National Milk Publicity Council.

Jubilee Celebrations.—On Saturday, May 11, 70,000 London County Council school-children were marshalled in the Mall and Constitution Hill to witness a Jubilee processional drive by Their Majesties the King and Queen. The Milk Marketing Board arranged for the distribution of free cartons containing $\frac{1}{2}$ pint of milk to each child, and the Potato Marketing Board also made a gift of potato crisps. The milk so consumed ranks for Exchequer subsidy, as the assembly on that occasion was regarded as an "approved centre" for the purposes of the Milk-in-Schools Scheme.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by May 9, 1935, to £2,396,940. These payments were in respect of 1,000,614 animals, the average payment per beast being £2 7s. 11d.

Killing-out Standard.—The Cattle Committee, after consideration of representations made to them regarding the killing-out standard of 54 per cent. to which animals must conform in order to be eligible for subsidy, recommended on May 8, 1935, that no change in that standard should be made. In this recommendation, the Ministers responsible for agriculture in Great Britain and Northern Ireland concurred.

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Wheat Act, 1932.—*Sales of Home Grown Wheat.*—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1934, to May 3, 1935, cover sales of 30,334,074 cwt. of millable wheat, as compared with 24,865,703 cwt. in the corresponding period (to May 4) in the last cereal year.

Wheat Deficiency Payments.—The Wheat Commission have made a third advance payment to registered growers in respect of the current cereal year.

This payment is at the rate of 3s. per cwt. (13s. 6d. per quarter) to 31,250 growers in respect of 7,730,000 cwt. (1,717,777 qr.) of wheat vouched for by 43,950 wheat certificates delivered to the Commission by the growers concerned during the period January 26 to April 5, 1935. The amount of this advance is approximately £1,159,500.

The Wheat Commission hope to make one further advance during the current cereal year at a date to be announced later.

National Mark Eggs.—The total output of the National Mark Egg Packing Stations for the three months, January to March, 1935, was 149.2 million eggs, of which 123.8 million were packed under the National Mark, as compared with 134.6 million and 110.3 million, respectively, for the corresponding period of 1934. The following table shows the aggregate monthly output of the stations during these periods:—

Month	1934			1935		
	Total output of Packing Stations (Fresh eggs)	Output under National Mark	Percentage of total output under National Mark	Total output of Packing Stations (Fresh eggs)	Output under National Mark	Percentage of total output under National Mark
	Millions	Millions	Per cent.	Millions	Millions	Per cent.
January	36.5	30.4	83	44.6	37.3	84
February	38.5	31.8	83	43.6	36.3	83
March	59.6	48.1	81	61.0	50.2	82
Totals for 3 months	134.6	110.3	82	149.2	123.8	83

National Mark Canned Fruit and Vegetables.—At a recent meeting of the National Mark Canned Fruit and Vegetables Trade Committee, the operation of the scheme during the 1934 season was reviewed.

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Canners in 1934 again experienced difficulty in producing satisfactory packs of the Purple Pershore plum, which, on account of its delicate texture, so easily disintegrates when canned. Unfortunately there is, at present, no suitable variety of red plum that can be considered a satisfactory substitute. In these circumstances, the Trade Committee recommended that the Purple Pershore should be retained as a permitted variety for canning under the National Mark, which should not, however, be applied to any day's pack where the examination of samples suggests that the quality might not be up to the required standard.

The inclusion in the scheme of further varieties of other fruits suggested by authorized canners was considered, and the Committee recommended that the "Wellington" apple and "Whitesmith" gooseberry should be allowed experimentally for the 1935 season.

The Committee considered that it should be made a requirement of the National Mark Scheme that all authorized vegetable canneries must be equipped with pressure retorts suitably fitted with an efficient thermometer and pressure gauge. In agreement with the Committee of the Fruit and Vegetable Canners' Association, it is proposed to introduce the necessary amendment into the scheme in 1935.

National Mark Bottled Fruit and Vegetables Scheme.—The definitions of quality at present set out in the regulations governing the application of the National Mark to bottled fruits and vegetables refer mainly to the quality of the raw material, and might therefore present difficulties of interpretation in cases of dispute as to the quality of the finished product. The National Mark Bottled Fruit and Vegetables Trade Committee recently recommended that the regulations should be made to correspond with those for National Mark canned produce, in which the definitions refer to the quality of the finished product. It is accordingly proposed to introduce revised regulations in time for the 1935 season.

The quantity of home fruits bottled in syrup is at present small, although the superiority of the product over water packs is such that, in the opinion of the trade committee, the demand is likely to increase. One obstacle to an increase in the output of syrup packs is the high cost of processing (compared with competitive canned fruits), and the committee emphasizes the need for further research to over-

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come certain difficulties, e.g., the prevention of excessive "floating" of fruits. To encourage the packing of fruits in syrup, grades for "Heavy" and "Light" syrups, have been drawn up, on the recommendation of the Food Manufacturers' Federation and the Trade Committee, and it is proposed that these shall be prescribed for this season.

The question of standard capacities for bottles, fittings and caps is being investigated by a sub-committee of the Trade Committee in conjunction with the Food Manufacturers' Federation.

The Perry Industry.—The National Mark Scheme for Perry, which was referred to in the issue of this JOURNAL for December, 1934, has now come into operation. Makers of perry who wish to be authorized to use the National Mark on their perry are invited to apply to the Ministry for a copy of the descriptive leaflet (Marketing Leaflet No. 55).

Royal Horticultural Society's Early Market Produce Show: Ministry's Exhibit.—The Ministry staged an exhibit of National Mark produce at this Show which was held on April 24 and 25. The object of the display was to illustrate the method of marketing of vegetables in accordance with National Mark standards, and, although the exhibit was on a smaller scale than last year, it attracted considerable interest from growers.

Other Exhibits.—A prominent feature of the Show this year was the display of collections of vegetables in market packages.

The exhibit of the Cheltenham Growers' Club (Fig. 1) was especially interesting, showing the value of such Associations in assisting the smaller growers to market their produce in an up-to-date manner.

Included in the comprehensive exhibit of the South Lincs Growers were several examples of the successful use of the National Mark incorporated in a grower's private label. Fig. 2 shows this mark branded on a crate of National Mark cabbage. Such a method of application enables the individual grower to enjoy the many advantages of the National Mark whilst maintaining the identity of his own private trade mark.

An original design for a private label was displayed on one grower's stand (Fig. 3), which is a most attractive and effective form of advertisement. The use of such labels on well-graded and well-packed vegetables is of value in promoting demand.

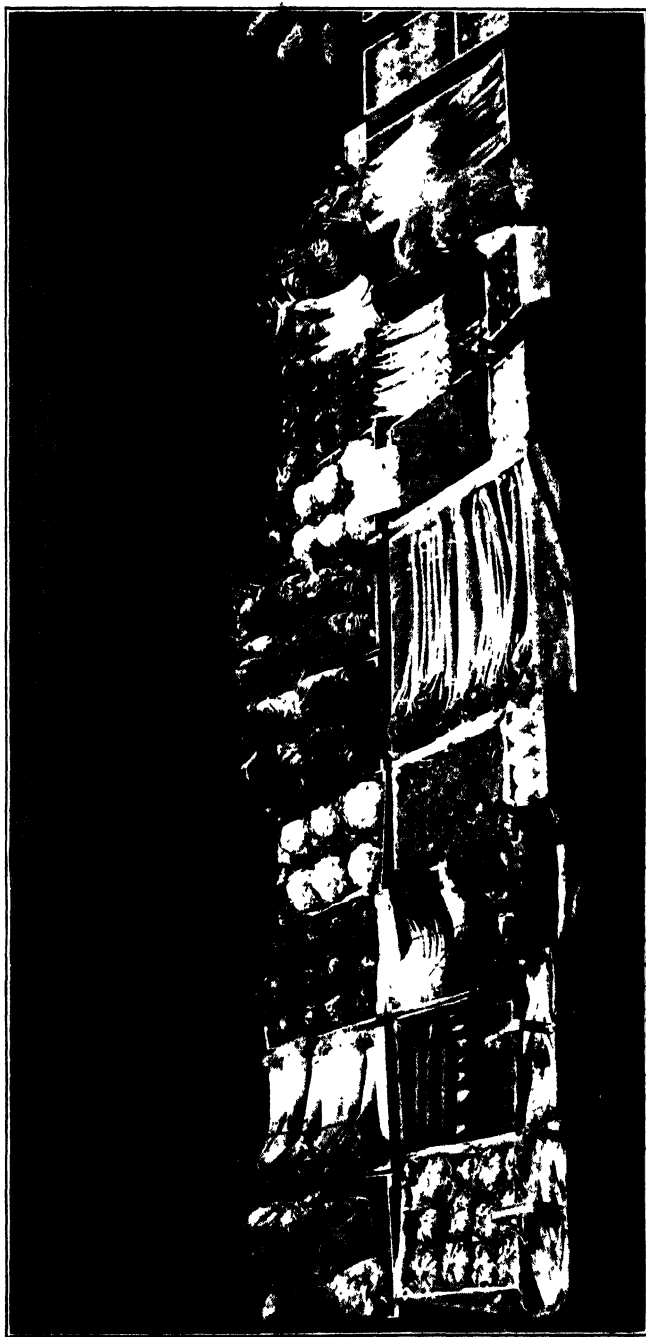


FIG. 1. A pleasing exhibit of vegetables by a club of growers enrolled in National Mark Schemes.

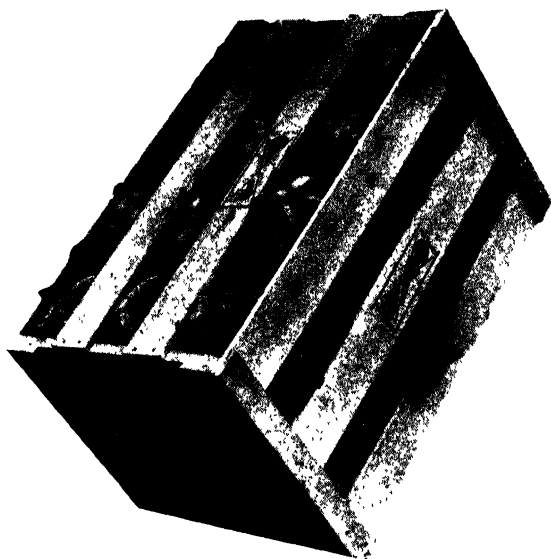


FIG. 2. The National Mark Scheme. Cabbage greens packed in the Roscoff type broccoli crate.

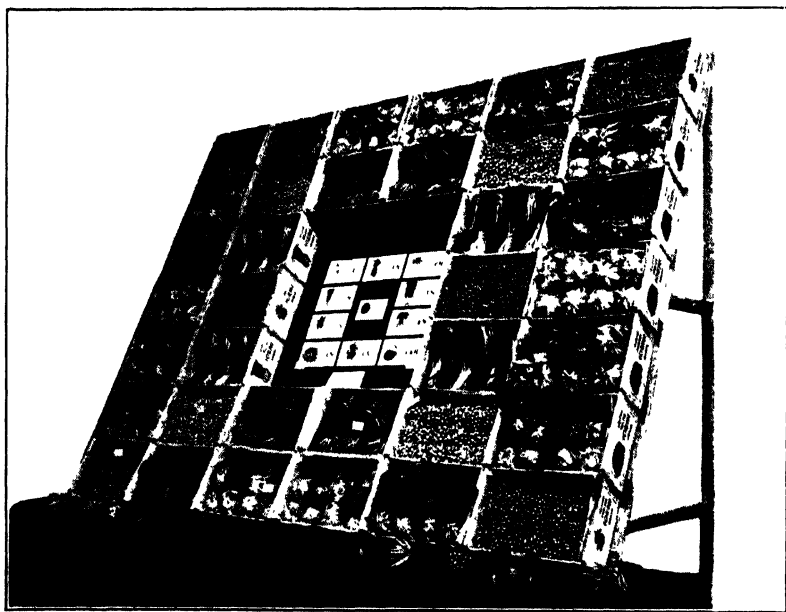


FIG. 3. A range of vegetables packed under a private label. (The label bears a pictorial representation of the vegetable in the container.)

MARKETING NOTES

Canada : Jam Marketing Scheme.—A scheme under the Natural Products Marketing Act, 1934, to regulate the marketing of all jams, jellies and marmalades produced by manufacturers within the Dominion of Canada was approved by Order-in-Council of April 6, 1935, and became effective on April 10, 1935.

The purpose of the scheme is to regulate marketing in accordance with the demand throughout the year. It is to be administered by a Jam Marketing Board, at Toronto, under the supervision of the Dominion Marketing Board. The Jam Marketing Board is to consist of fourteen members—nine licensed manufacturers elected annually at meetings of licensed manufacturers in Ontario, Quebec and British Columbia (3 each), three members to represent producers of such fruit as forms the basis of the regulated product (being, if possible, the delegates of local boards for Ontario, Quebec and British Columbia), one member to represent consumers, and a chairman chosen by the other members. A provisional board is named in the scheme.

The Board may register and license manufacturers and others engaged in the marketing of the regulated product and may require information and returns relating to its production and sale. The Board is given wide powers for the regulation of marketing, and may prohibit the sale of jams, jellies and marmalades below certain grades. The Board may institute a system of labelling containers, and provision is made for a marketing levy to cover the expenses of the scheme.

Any order or determination of the Board may, within thirty days of its promulgation, be annulled by the Board at the instance of licensed manufacturers representing at least sixty per cent. of their total number and controlling at least fifty-one per cent. of the total business in the registered product. A poll as to whether or not the scheme shall remain in effect may be demanded by registered manufacturers representing one-third in number and volume of business controlled.

Pig Supplies in Switzerland and Austria.*—The increase of the milch cow population by 300,000 head as compared with the pre-War level and the decline in the exports of milk products by 20 per cent. are considered by the agricultural interests to be important causes of the present over-supply of pigs in *Switzerland*. The surplus milk that was formerly turned into condensed milk and milk powder is now going to the creameries for the manufacture of butter, and the large quantity of skim- or butter-milk available at cheap prices to pig keepers has given an impetus to pig production. The pig population is now 1,200,000 as compared with 500,000 to 600,000 in 1914. Plans advocated to reduce this population include (i) the gradual reduction, through Government measures, of the number of milch cows, leading to a reduction in skim- or butter-milk for pig feeding, and (ii) the restriction of imports of feeding stuffs.

Austria is also faced with the problem of a considerable increase in pig production, encouraged by large unrestricted imports of feeding stuffs. Vienna is reported to have consumed in 1934 about 142,000 more pigs than in 1933. One effect has been a general depression of cattle prices. The regulation of pig production is declared to be impracticable owing to the very large number of smallholders, and a check on imports of feeding stuffs is suggested as the most practical solution.

* Note by the Market Supply Committee.

MARKETING NOTES

Plans to Increase Milk Consumption on the Continent.*—The following instances of measures taken or proposed in certain Continental countries to increase the consumption of milk are of interest.

In *Austria*, surplus milk is to be made available for welfare institutions at a lower price than ordinary milk when it is utilized to supplement consumption. This cheap delivery will be made possible by permitting the agricultural co-operatives to make a slightly higher charge to the wholesalers for pasteurized milk. In addition, butter will be delivered to welfare institutions at a lower price, the Milk Equalization Fund being used to finance this measure. This is a Fund obtained from a levy on milk producers amounting to 10 per cent. of the price received for their milk.

In *Switzerland*, the supply of milk in schools is to be considerably extended, and propaganda for increased milk consumption is to be introduced.

In *Italy*, the consumption of fresh milk is being encouraged by the establishment of central milk depots in the large towns, giving improved and regular supplies. Various measures have also been taken to stimulate the production and consumption of butter; these include an increase in the import duty on butter and the prohibition of the use of margarine except for the manufacture of biscuits, etc. The extension of pig-breeding—Italy, relative to its population, has the smallest pig population in Europe—is considered to be fundamental to the development of the Italian milk industry.

In the *Netherlands*, a measure has recently been introduced to secure the greater utilization of skim milk for feeding to live stock in order to overcome the difficulties experienced in the cheese, milk powder and condensed milk trade. It is now compulsory for factories to return to the milk producer in the form of skim milk a certain percentage of the milk delivered to them. The maximum percentage to be returned has been fixed at 20, but the actual figure and the price of the skim milk will be determined from time to time.

In *France*, increased consumption of milk is to be encouraged under the Milk Marketing Bill at present before the Senate, by improving the quality. This will be effected through an increase in dairy control and the strict enforcement of a minimum fat content.

Milk Prices on the Continent.*—The prices which the *German, Austrian and Swiss* farmers are at present receiving for their milk show a marked similarity. At the current rate of exchange the producer's price for milk delivered in *Berlin*, is equivalent to 13*d.* per gal. In *Austria*, the farmer receives from the creameries the equivalent of 13.3*d.* per gal., and the guaranteed price in *Switzerland* is equivalent to 13.25*d.* per gal. The retail price in *Berlin* for full milk at shop is 22*d.* per gal.; in *Austria*, the average retail price is 20.7*d.* per gal., and in *Switzerland* 22.6*d.* per gal.

* Notes by the Market Supply Committee.

JUNE ON THE FARM

E. J. ROBERTS, M.A., M.Sc.,
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TILLAGE and haymaking operations demonstrate the intensity of the sun's rays in this month. A comparison of haymaking in June with harvesting a second crop of clover in late summer, or of weed destruction in a bare fallow with that in a bastard fallow, emphasizes the difference in the weather and the sun's power before and after midsummer. The drying and wilting power of the sun and wind is put to good effect in the destruction of weeds by intertillage and by the bare fallow.

Bare Fallows.—In spite of the large area of clay land that has been laid down to grass during the last forty or fifty years, the area of bare fallow has always been considerable. Even during the last ten years it has averaged about 400,000 acres, practically the same area as that of sugar-beet in England and Wales in 1934, much more than that of mangolds, and not far short of the area devoted to turnips and swedes. The area of bare fallow fluctuates a good deal from year to year; in recent years, for instance, the figures for England and Wales have been as low as 294,000 acres (in 1930) and as high as 463,000 (in 1925). The distribution of fallow is interesting, and clearly indicates that it is mainly on the heaviest class of soil that recourse is had to this expensive way of cleaning land, and also that a hot dry summer is essential for successful results. The counties with about 10 per cent. or more of the arable land under fallow are Bedfordshire, Berkshire, Buckinghamshire, Essex, Hertfordshire, Huntingdonshire and Northamptonshire. In Wales and Scotland the proportion is negligible: there, the cooler and moister conditions would in many seasons render a fallow ineffective, and the system of long leys keeps couch in check.

When the bare or summer fallow has to be used to clean land, couch grass is killed out more completely if the soil is kept as lumpy as possible; many believe in carrying out the first ploughing when the land is wet, thus helping the formation of large clods. The clods must be turned over now and again by the plough or cultivator in order to

JUNE ON THE FARM

allow of baking from all sides. Instances are not infrequent where, owing to neglect to turn over the lumps, a bare fallow has entirely failed to eradicate couch under weather conditions that were ideal for that purpose. If a clod is allowed to remain long in one position, it will be found to be slightly damp underneath, and just enough moisture will pass up from below to maintain the couch in a dormant condition.

In a recent conversation on this subject, Professor G. W. Robinson threw out the interesting suggestion that the soil, in the process of drying, not only reaches the stage where it ceases to supply the plant with water, but may attain such a degree of dryness that it may begin to extract water from the rhizome, provided the latter remains in intimate contact with the soil. Intimate contact in this sense means contact through undisturbed root hairs, such as would occur in the case of a rhizome in an unbroken clod. This may explain the more complete destruction of couch if the fallow is maintained as lumpy as possible. In loose soil, the destruction of the rhizomes would depend only on the failure of the soil to supply them with water, followed possibly by some evaporation from the roots into the soil air.

Where the summer fallow is aimed more at the destruction of annual than of perennial weeds, a loose condition of the soil is better, since it encourages a larger number of weed seeds to germinate.

It is interesting to note that the summer fallow, which was so largely superseded by the introduction of roots and other cleaning crops at the end of the eighteenth century, seems to be almost an essential feature of the modern system of mechanized grain growing. In some instances, the introduction of a proportion of certain fallow crops such as kale, that are amenable to mechanized methods, is being recommended as a means of providing employment for the staff in the interval between sowing and harvest.

Sodium Chlorate and Couch Grass.—The possibility of destroying couch without tillage is envisaged by an interesting experiment on the use of sodium chlorate for this purpose reported from the Edinburgh and East of Scotland College of Agriculture. In 1933 sodium chlorate was applied in the autumn as a spray to a couch-infested stubble; a wet spray in two applications, supplying a total of $1\frac{1}{2}$ cwt. of

JUNE ON THE FARM

chlorate to the acre, was used in preference to an application in the dry state in order to get even distribution. The couch was almost completely killed to the depth of the furrow. Turnips were drilled late in May, 1934, and no harmful effects of sodium chlorate on germination were noted. At this stage, the treated ground was clearer than the adjoining plot, from which three "crops" of weeds had been removed in autumn at a cost of 32s. per acre. The authors recommend that a period of five months should elapse between the final application of the chlorate and the sowing of seed. It is probable that the toxicity period depends on the rainfall after application. American investigators found no loss of toxicity of sodium chlorate which had been in contact with the soil for two years.

Bracken Eradication.—Bracken covers a large area of mountain land, and also some lowland, that would provide good grazing if this weed could be controlled. Besides causing loss of grass, bracken adds to the expense of shepherding, since sheep affected with maggots take cover in it. Sodium chlorate can be used effectively against this weed, a dressing of 2 cwt. per acre being effective. In an experiment on bracken eradication at the College Farm, Aber, plots were treated with 2 and with 1 cwt. per acre of this substance on April 26 of last year. The plots were sown down with grass and clover seeds four months later, and no trace of toxicity could be detected; the rainfall in the period between the application of the chlorate and the sowing of the seeds was 16 in. Preliminary investigations at this College indicate that treatment with 2 cwt. sodium chlorate per acre in April might be effectively followed up by setting fire to the surface material in June, and seeding down with a cheap mixture of seed cleanings in August. The present cost of sodium chlorate (25s. per cwt.) makes it too expensive, however, for general use against bracken.

Bracken can be controlled by persistent cutting, and, if the ground is sufficiently level for the use of mowing machines, the cost is not prohibitive. Where only one cutting a year is possible, this should be done about the middle of July; careful cutting each year will give satisfactory control in three or four years. Where two cuttings a year can be carried out, the first should be made in June, and the second in August. At the farm attached to this College, bracken cutting in mid-July used to be practised

JUNE ON THE FARM

with successful results; unfortunately, this is usually the time of greatest pressure in the hay harvest, and, when a silo was built, the congestion of work on the lowland in July made it impossible to undertake bracken cutting in that month.

If a change of attitude towards bracken eradication were brought about, and a farmer were to consider it worth while to keep a man continuously on a given area for about four months, it is possible that a cheaper method of control by cutting could be offered. The stems of this plant are brittle, and easily cut, up to the time when not more than two pairs of leaves have unfolded on the frond; at this stage, the bracken has a lightish green colour. If the bracken is cut in rotation, so that none of it gets beyond this stage of growth, very little effort is needed in the cutting. The method, however, entails a large number of cuttings. Thus, in one trial, five cuttings had to be made, extending from May 21 to September 2, and an average of over 100 stems were cut to the square yard. In the following year, six cuttings were made, and the stems still averaged 60 to the yard. In the third year, the fronds were sparse and small. Although eleven cuttings were made, the effort needed for cutting was very small. If a man were kept at this work continuously from the middle of May to the middle of August, working on an area of such a size that he could keep cutting all the bracken in rotation before the "stringy" stage was reached, he should manage about 70 acres; each portion of this area would have to be cut about once in three weeks. The cost over the two years would thus be about 14s. per acre.

Hay Harvest.—Only a small proportion of the hay crop in N. Wales is harvested in June. This is due to the large area of uplands, and to the heavy stock of sheep kept for fat lamb production on the lowlands. It is usually difficult to clear the fields of stock before May 1. In an area with heavy rainfall, there is usually much to be said for obtaining the required quantity of hay from a larger area of late-grazed pastures, rather than from a smaller acreage of land put up for hay early, and yielding a heavy crop.

On a cattle rearing or dairy farm, success in winter feeding is perhaps more dependent on the quantity and quality of the hay than on any other factor. Of the many attributes of the successful farmer, one of the most important

JUNE ON THE FARM

is the ability to provide at practically all times a sufficiency of home-grown hay of good quality.

An interesting example of food poisoning in dairy cows was encountered a few years ago—probably caused indirectly by hay shortage. The hay contained a considerable quantity of Ragwort, which is poisonous. It is probable that, if the amount of hay supplied in the ration had been ample, the cows would have left most of the Ragwort plants uneaten. This plant is rarely encountered on land that is grazed by sheep, since they graze it down and prevent it attaining any size.

Grass Lambs.—The disposal of fat lambs often requires the exercise of careful judgment. Early in the season the price per lb. is high, but weights are small, and, if grass is plentiful, there is naturally a desire to keep them to more mature weights. A thriving lamb well supplied with milk by the right type of mother may be expected to put on 3 to 4 lb. a week, the rate falling off as the lamb nears full size. Such an increase is far greater than that put on by a mature sheep, and counterbalances a moderate drop in the price per lb. Thus, taking actual Liverpool quotations for 1934, a 32-lb. (d.w.) lamb at 10½d. was worth 28s. on June 19. On July 16, a 38-lb. lamb, such as would have been obtained by keeping on the 32-lb. animal, was worth 31s. 8d. at 10d. per lb. It must be borne in mind, however, that, if buyers do not favour the heavier lamb, the difference in price received for the heavier lamb would be considerably less. Again, it must be remembered that the sale of the lamb is not the only factor that determines profit or loss. As often as not, in a temporary flock, the sale of the fat ewes is even more important. In June there may be a fair demand for such; in August and September there is usually very little, and it may be wiser to market the lambs a little too early than to run the risk of having to accept a really bad price for the fat ewes. Besides, early clearance of land may give the chance of taking a light hay crop and giving the grass a chance to freshen up for the next lot of sheep in the autumn.

Producers in areas with a poor local demand, or where the buying is in the hands of one or two dealers, should consider the advisability of selling by quotation on the grade and dead weight system operated by the Ministry. Even where fair competition exists in the local markets, the sale

JUNE ON THE FARM

of occasional lots of lambs by this system has a good effect on dealers' prices, as they are reminders of an alternative channel for the disposal of the lambs. This scheme, explained in the Ministry's Marketing Leaflet 27 (a), consists in obtaining, from wholesalers, quotations on a grade and dead weight basis, the Ministry's graders supervising the weighing and undertaking the grading and all arrangements at the buyer's end; the farmer receives his cheque in two or three days.

In Wales, where fat lambs occupy an important position in the agriculture of the country, many thousands of lambs have been sold under this system in the past three years. Local organizations have been built up in co-operation with the N.F.U., and group agents have been appointed to act for farmers in their area; in this way, speed and low working costs are attained in getting quotations, transport, etc. Apart from the advantages mentioned above, an indirect benefit of another kind was evident last year, particularly in Anglesey. Wholesalers who had bought under the scheme in the previous year sent out buyers into the county, and an altogether healthier tone was evident in the local markets.

The selling of lambs at this time of the year must cause considerable suffering and perhaps subsequent udder trouble to the ewes, except in those few instances where they are milked out a few times. Improvements in breeding and in grass-land management have resulted in a large proportion of grass lambs being ready for sale at a time when the grass is at a high nutritive value and the ewes are in full milk. The capacity of the hill sheep to withstand one or more of such weanings when they are brought down to the rich pastures is another tribute to their hardiness and adaptability. Probably the unnatural practice of taking away the lamb while the ewe is still in full milk is partly responsible for the prevalence of toxæmia of pregnancy among heavy milking breeds in certain seasons. When the ewes are retained on good land for another breeding season, they tend to become excessively fat by autumn. Then, if a hard winter follows, there is likely to be a good deal of trouble from this complaint just before lambing. Placing the ewes on poor pasture after taking away the lambs, not only reduces the flow of milk, but prevents their becoming excessively fat and may save many losses in spring.

JUNE ON THE FARM

In the old days, it was customary to milk ewes after weaning the lambs, and to use the milk for cheese-making. Again, in the old system of house-feeding lambs, practised most commonly in the eighteenth century in Middlesex and Hertfordshire, it was customary to let the remaining lambs suck not only their own mothers, but also those ewes whose lambs had been sold. The cost of labour precludes such systems nowadays, but it would be a boon to fat lamb producers if someone could devise an easy means of inducing ewes to adopt other lambs after their own have been sold. In some districts to-day owners of small flocks milk the ewes two or three times after the lambs are taken off. With larger flocks, where the labour question is more acute, a lot of good might be done by taking into the buildings the ewes that stay and bleat about the gate after their lambs have been taken off. This would reduce the flow of milk and would give an opportunity of milking them before turning them out again. After all, this would take no longer than trimming the feet, and would give an opportunity for inspecting the ewes.

NOTES ON FEEDING

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Cheese-making.—With the cows at grass the dairymaid's difficulties increase and multiply. The spring months have always been regarded as the worst for cheese-making. Until recent years "boosey cheese," i.e., cheese made while cows are still on winter fodder, was regarded as necessarily second class, and to this day no maker in the Cheshire area willingly stores cheese made in May. The wild white clover in July is popularly credited with creating its own special difficulties; while the mature grass of September produces the finest cheese of the season.

It would not perhaps be quite true to say that our forefathers attributed all cheese-making difficulties to the food the cows ate, for weather conditions—and in particular temperature—must, all along, have been recognized as a contributory cause. Certainly the major part of the dairymaid's problems have in days gone by been put down to variations in the milk caused by alterations in diet.

Food is no longer a terrifying bogey. Certain gross taints apart, most variations arising from foods can be countered by suitable modifications in cheese-making routine. First-quality cheese can be produced regularly and consistently in well-equipped dairies throughout the winter months. Many of the difficulties formerly held to arise from diet are now known to be due to bacterial contamination. They can be avoided by ordinary hygienic precautions in milk production. There remain, however, some whose origin is obscure; neither cause nor cure can be stated with confidence. One such difficulty (or group of difficulties) can be described as "slow" cheese.

Modern cheese-making resolves itself very largely into acidity control; the quantity of a standard solution of caustic soda required to neutralize the whey draining from the curd has been proved by long experience to be a fairly reliable guide to the rate of development of the required characteristics, and upon such measures a tolerably standardized system of manipulation has been built up. Normally, the rate of development of acidity can be regulated by the amount of artificial starter employed—the maker can, so to

NOTES ON FEEDING

speak, regulate the cheese-making clock before the routine operations commence, and thereafter any modifications of procedure that may be necessary to ensure a standard product will be of a minor kind only. In ordinary circumstances the scheme works very well. Now and again something goes wrong and the making process drags intolerably. The maker must wait, and keep on waiting, for the acidity to come. In extreme cases she may be still waiting when the evening's milk arrives for the next day's cheese. As a rule examination of the making record will show that the first sign of "something going wrong" has occurred about half way through the process—the coagulation has been normal, and not until the curd settled out from the whey has retardation set in. No simple explanation can account for all the material facts connected with "slow" cheeses, but the burden of evidence often points to the milk as the prime villain of the piece.

The starter is, of course, the immediate defaulter in that it has failed to do what was expected of it, and what, in fact, it has been in the habit of doing. Sometimes it is indeed at fault—it has accidentally become contaminated in the day-to-day process of cultivation. At other times the starter itself (made, it should be borne in mind, from the same milk, pasteurized) develops acidity at the customary rate, though it fails to promote acidity in the bulk to which it is added.

There can be little doubt that not all "slow" cheeses are referable to one and the same cause. Sometimes they are plainly due to bacterial contamination of utensils, for they can be disposed of by quite ordinary precautions. Possibly others are due to contamination with thermophilic bacteria capable of resisting the usual sterilization temperatures. Other cases are suggestive of subtle chemical or enzymatic variations in the milk attributable to food supplies.

Wheels within Wheels.—Life would be a great deal simpler if only nature would obey the text books. As it is, most of us spend our school days learning the simple parables of biological teaching, and the rest of our lives discovering how imperfect the parables really are. Perhaps this is all for the best. Bear's meat is not for children, and if our teachers had to tell us all they don't know about, say, the ascent of sap in trees, they would scarce find time to teach us anything.

NOTES ON FEEDING

The nitrogen cycle which begins with proteins in the animal body, includes decomposition to nitrates in the soil, absorption by root hairs, elaboration in plant leaves, consumption and digestion by animals with the eventual re-appearance of the original compound, forms a beautifully complete little diagram; not too simple, of course, because some nitrogen escapes from the cycle and has to be recaptured by the *Leguminosae*.

A valuable review by Dr. Nicol reminds us that there are other complications, other little wheels running within the large one. Many plants—cereals in particular—can absorb organic nitrogenous compounds direct. Hence an animal protein may be absorbed by a plant while still only part decomposed, and the simple cycle protein—amino—acid—protein may therefore go rolling on for ever. In the second place, members of the *Leguminosae* and certain other plants enrich the soil in organic nitrogen *during their growth*. It is not quite clear whether this enrichment of the soil is due to exudations from the living cells of the roots, or to a continuous process of sloughing away of the nodules and peripheral cells of the roots. It seems to be beyond dispute, however, that the soil around the living root system of the legume is enriched in organic nitrogen; and under the conditions of pot experiments such plants as cereals growing alongside definitely react to the stimulus. One can feed a cereal by growing a legume beside it.

To what extent non-leguminous plants in ordinary agricultural practice benefit by this "suckling" process it is very difficult to say. There is clear evidence that cereals benefit to some extent from clover "seeds" sown amongst them, and pot culture work suggests that such plants as vetches may also feed cereals in forage mixtures. Grasses, of course, derive nitrogen from clovers, but when one has to deal with a perennial like wild white clover it is scarcely possible to distinguish between immediate and residual effects; the plant is almost immortal by reason of its capacity for synchronous growth and decay. It may, therefore, be that the bulk of the nitrogen absorbed by non-leguminous agricultural plants is absorbed as nitrate—as the text books aver. On the other hand, some at least must be absorbed in organic form from living legumes. The question is, how much? Quite a lot of economic problems hang on the answer.

NOTES ON FEEDING

Standards of Measurement.—Agriculturists are accustomed to the difficulties of accurate measurement; the difficulties are inherent in all living things, and for the most part in products of animal or vegetable origin. Even such a simple matter as the determination of the weight of hay in a rick constitutes a pretty little problem in mathematics. Some progress towards accuracy we are undoubtedly making, but progress in such matters necessarily depends on the mass rather than on the individual. No man by himself can effectively employ a new measure, the whole value of which depends on general acceptance. We may take heart of grace from the fact that we are not alone in our difficulty; the biochemists are in similar case in the measurement of vitamins.

Early work on vitamins was concerned chiefly with presence and absence tests. Later, the question of quantitative determination arose. The layman, reading of vitamin determinations and thinking back on the chemistry classes of his schooldays, visualizes perhaps a process of extracting the compound from a food by some refined method of filtration or precipitation. It is not at all like that. It is a biological affair. For the most part vitamins are estimated by inference, and what this process of inference involves one may gather from a study of the recommendations of the international conference on the subject held last year.

Vitamin Assay.—Take two young rats: not just ordinary rats from under a hen house, but sacred rats. They are to be found running about in the temple of science in every land to-day, all more or less related and hereditarily attuned to the job in prospect. Two of these you must obtain. Feed them for some weeks on a diet that contains a high proportion of calcium and a low proportion of phosphorus; is free from vitamin D but contains all other essentials for healthy growth (in order to be sure of all these things you will have to have a lot of preliminary trials with other rats of the same family). In time the rats will develop rickets. Next obtain from some suitable source (there is only one in this country) a supply of a standard solution of irradiated ergosterol. To the ration of one of your rats you now add a given quantity of the food whose vitamin content you wish to determine; to the ration of the other a given quantity of the standard ergosterol.

NOTES ON FEEDING

If all goes well, both rats will begin to improve and the rate of improvement in each case is a measure of the vitamin content in the added substance. Measurement of the improvement is quite a simple matter. All you have to do is to make an X-ray examination of the distal ends of the ulnæ, comparing the degree of calcification in each case with a standard "scale of healing" that you have drawn up as a result of previous experiments. If you are very lucky the two rats may show the same rate of recovery, but most likely they will not. In that case you must take some more rats and feed graded doses of the standard and of the food under examination until you hit on two that give similar results. You will then know how the food and the standard compare.

At least you would if all rats of the true faith behaved equally. Actually they do not. It is necessary, therefore, to repeat the trial. Bearing in mind that the error due to the individuality of the rat varies inversely as the square root of the number of rats used, you will probably be satisfied with using ten rats in each lot. Eventually you will reach the conclusion that the foodstuff contains x units of vitamin D.

Of course that is only the crude outline of the method (or rather one method) for vitamin D. Many precautions not here described are necessary in practice to secure satisfactory results.

If it is vitamin A or C you are interested in, you will have to try something else. You may have to measure your results by determining the rate at which the rats recover from ophthalmia, or more simply the rate at which they grow: and you may have to use guinea pigs instead of rats. In any event the final result is obtained in international units; it is inferential only and expresses the content relative to some standard substance, not the absolute content of the vitamin itself. It becomes of value only when you or someone else has determined the international units present in other things, the international units needed by given animals. When these things are determined your assay becomes as useful as if it had given you the result in lb. per cwt.

All measures are relative. Even when we state that a stick is so many inches long are we not in reality saying that it is so many times longer than the first joint of the thumb

FARM VALUES OF FEEDING STUFFS

of a king, long gone to his account? The method of vitamin assay sounds a little complicated, not to say roundabout. In reality it is as much and as little absolute as the commonest measures of everyday life, and its ultimate utility depends on other people accepting the same king and the same thumb.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent</i>	<i>Protein equivalent</i>	<i>Per ton</i>
	<i>Per cent.</i>	<i>Per cent.</i>	<i>£ s.</i>
Barley (imported)	71	6.2	5 19
Maize	78	7.6	5 0
Decorticated ground-nut cake	73	41.3	6 15
„ cottonseed cake	68	34.7	7 0

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1.5 shillings, and per unit protein equivalent, 1.09 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

FARM VALUES.

Crop	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s
Wheat	72	9.6	5 18
Oats	60	7.6	4 18
Barley	71	6.2	5 13
Potatoes	18	0.8	1 8
Swedes	7	0.7	0 11
Mangolds	7	0.4	0 11
Beans	66	19.7	6 0
Good meadow hay	37	4.6	3 1
Good oat straw	20	0.9	1 11
Good clover hay	38	7.0	3 5
Vetch and oat silage	13	1.6	1 1
Barley straw	23	0.7	1 15
Wheat straw	13	0.1	1 0
Bean straw	23	1.7	1 16

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Wheat, British	£ 5 7	£ 0 8	£ 4 19	72	s. d. 1 4	d. 0.71	% 9.6
Barley, British feeding	5 15	0 7	5 8	71	1 6	0.80	6.2
" Canadian, No. 3 Western ..	6 10	0 7	6 3	71	1 9	0.94	6.2
" Argentine	6 0†	0 7	5 13	71	1 7	0.85	6.2
" Danubian	5 12*	0 7	5 5	71	1 6	0.80	6.2
" Persian	5 17	0 7	5 10	71	1 7	0.85	6.2
" Polish	5 17	0 7	5 10	71	1 7	0.85	6.2
Oats, English, white	7 17	0 8	7 9	60	2 6	1.34	7.6
" " black and grey	7 13	0 8	7 5	60	2 5	1.29	7.6
" Scotch, white	8 5	0 8	7 17	60	2 7	1.38	7.6
" Canadian, No. 2 Western ..	8 3	0 8	7 15	60	2 7	1.38	7.6
" " No. 3	7 10*	0 8	7 2	60	2 4	1.25	7.6
" " mixed feed	7 2	0 8	6 14	60	2 3	1.21	7.6
" Chilean	7 10‡	0 8	7 2	60	2 4	1.25	7.6
Maize, Argentine	5 0	0 6	4 14	78	1 2	0.62	7.6
" Danubian, Gal. Fox	5 10†	0 6	5 4	78	1 4	0.71	7.6
" South African, No. 2 White Flat	5 2†	0 6	4 16	78	1 3	0.67	7.6
" South African, No. 4 Yellow	5 10†	0 6	5 4	78	1 4	0.71	7.6
Beans, English, winter	6 0‡	0 16	5 4	66	1 7	0.85	19.7
Peas, English, blue	7 10‡	0 14	6 16	69	2 0	1.07	18.1
" Indian	9 0†	0 14	8 6	69	2 5	1.29	18.1
" Japanese	12 7†	0 14	11 13	69	3 5	1.83	18.1
Dari	6 17†	0 7	6 10	74	1 9	0.94	7.2
Milling offals—Bran, British " broad	5 7	0 14	4 13	43	2 2	1.16	9.9
" middlings, fine, imported ..	5 15	0 14	5 1	43	2 4	1.25	10
" Weatings†	5 7	0 12	4 15	69	1 5	0.76	12.1
" " Superfine†	5 12	0 13	4 19	56	1 9	0.94	10.7
" Pollards, imported	6 5	0 12	5 13	69	1 8	0.89	12.1
Meal, barley	5 2	0 13	4 9	50	1 9	0.94	11
" " grade II	7 7	0 7	7 0	71	2 0	1.07	6.2
" " maize	6 12	0 7	6 5	71	1 9	0.94	6.2
" " South African	5 12	0 6	5 6	78	1 4	0.71	7.6
" " germ	5 6	0 6	5 0	78	1 3	0.67	7.6
" locust bean	5 12	0 10	5 2	79	1 3	0.67	8.5
" bean	7 10	0 5	7 5	71	2 1	1.12	3.6
" fish, white	8 5	0 16	7 9	66	2 3	1.21	19.7
Maize, cooked, flaked	13 15	2 0	11 15	39	4 0	2.14	53
" gluten feed	6 7	0 6	6 1	84	1 5	0.76	9.2
Linseed cake, English, 12% oil ..	6 0	0 12	5 8	76	1 5	0.76	19.2
" " " 9% "	8 7	0 19	7 8	74	2 0	1.07	24.6
" " " 8% "	8 0	0 19	7 1	74	1 11	1.03	24.6
" " " 8% "	7 15	0 19	6 16	74	1 10	0.98	24.6
" " " 6% "	8 2‡	0 19	7 3	74	1 11	1.03	24.6
Soya-bean cake, 54% oil	7 17‡	1 6	6 11	69	1 11	1.03	36.9
Cottonseed cake—English, Egyp- tian seed, 44% oil	4 12	0 16	3 16	42	1 10	0.98	17.3
" " Egyptian, 44% "	4 2	0 16	3 6	42	1 7	0.85	17.3
" " decorticated, 7% " ..	7 0†	1 6	5 14	68	1 8	0.89	34.7
" meal, decorticated, 7% " ..	7 0†	1 6	5 14	68	1 8	0.89	34.7
Coconut cake, 6% oil	6 5	0 16	5 9	77	1 5	0.76	16.4
Ground-nut cake, 6.7% oil	6 0*	0 17	5 3	57	1 10	0.98	27.3
" " decor., 6.7% oil	7 0	1 6	5 14	73	1 7	0.85	41.3
" " " imported, decorticated, 6.7% oil ..	6 10	1 6	5 4	73	1 5	0.76	41.3
Palm-kernel cake, 44-54% oil ..	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " " meal, 44% oil	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " " meal, 1-2% oil	5 12	0 11	5 1	71	1 5	0.76	16.5

PRICES OF FEEDING STUFFS (*continued*)

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Feeding treacle	5 0	0 7	4 13	51	1 10	0.98	2.7
Brewers' grains, dried ale ..	5 0	0 10	4 10	48	1 10	0.98	12.5
" porter ..	4 12	0 10	4 2	48	1 8	0.89	12.5
Dried sugar-beet pulp (a) ..	5 15	0 5	5 10	66	1 8	0.89	5.2

(a) Carriage paid in 5 ton lots. * At Bristol ‡ At Hull. † At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of April, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by

market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N., 7s. 6d.; P₂O₅, 2s. 1d.; K₂O 2s. 11d.

MISCELLANEOUS NOTES

Summer Visits to Rothamsted and Woburn

FARMERS and others who are interested in the practical, technical and educational aspects of agriculture are again invited to inspect the experimental plots at Rothamsted and Woburn, at any convenient date from now onwards till the end of October. Sir John Russell, the Director, will be pleased to arrange for visits by parties of farmers and farm workers. Mr. H. V. Garner and Captain E. H. Gregory will act as guides, and even if unfavourable weather precludes a close inspection of the fields a profitable time may be spent in the demonstration hall at Rothamsted.

At Rothamsted, where the soil is a heavy loam, the classical fields form an unequalled demonstration of the effects of fertilizers on wheat, barley, mangolds and meadow hay. The continuous growing of wheat on Broadbalk field is of special interest to those who are now faced with the manurial and cultivation problems arising out of mechanized cereal farming. Modern fertilizer and cultivation problems are being investigated by the new field technique developed at the Station. These modern experiments are concerned with the manuring of potatoes, sugar-beet, wheat, barley,

MISCELLANEOUS NOTES

brussels sprouts and temporary grass. Special rotation experiments test various alternative methods of returning cereal straw to the soil, and the effect of green manuring is also being examined.

Additional experiments deal with poultry manure and other organic fertilizers, the effects of bare fallowing, and rotary cultivation. Tests of soil fumigants against insect and other pests are in progress. Good types of implements are on view at the farm and a complete electrical installation has been added. The various crosses of the half-bred sheep are among the problems of husbandry that are being studied.

The Woburn farm is on light soil. In addition to the classical fields, modern experiments are in progress on potatoes, barley, sugar-beet, carrots, pyrethrum and green manure crops. It is not possible to inspect both stations in one day.

It would be a convenience if ample notice of intended visits could be given, but no farmer need forgo his visit because he has been unable to fix a date. All communications and requests to visit the Station should be addressed to The Secretary, Rothamsted Experimental Station, Harpenden.

Visits to N.I.A.B. Farm Crop Variety Trials

MR. WILFRED H. PARKER, M.C., M.A., Director of the National Institute of Agricultural Botany, Cambridge, extends a cordial invitation to all who are interested in agriculture to visit the Institute during the summer months. Farmers who desire an assurance that they are growing suitable varieties of cereals, sugar-beet, roots and other crops, would be well advised to inspect the trials at Cambridge, Sprowston (Norfolk), Long Sutton (Hants), Cannington (Somerset), Newport (Salop), Askham Bryan (Yorks), and other centres. At these trials all the leading varieties will be found, including the latest introductions and others that are likely to reach the market in the near future. July is the best month for visiting the trials. Visitors will be welcome, singly or in parties, but arrangements should be made well in advance, by communicating with the Secretary, National Institute of Agricultural Botany, Huntingdon Road, Cambridge.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE April general index number of the prices of agricultural produce was 119 (corresponding month of 1911-13=100) or 7 points higher than in the previous month and 8 points above April, 1934. (If allowance is made for payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act, the index for April would be 126.) Changes in prices during the month under review were numerous, but were mainly of a minor and seasonal character. The factor responsible for the increase of 7 points in the general figure was the index for milk, which advanced from 161 to 215. The indices for wheat and fat sheep also were higher than in March, but those for fat cattle and pigs, potatoes and hay were lower.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1930.	1931.	1932.	1933.	1934.	1935.
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	—
June	131	123	111	100	110	—
July	134	121	106	101	114	—
August	135	121	105	105	119	—
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

Grain.—The average price of wheat during April was 4s. 10d. per cwt. or 3d. more than in March, and the index at 64 was 2 points higher. (If allowance is made for the "deficiency payment" under the Wheat Act, 1932, the index would be raised to 119.) Barley at an average of 7s. 2d. was 4d. cheaper on the month, and the index declined 2 points to 93. Oats, however, at 6s. 11d. per cwt. were 1d. dearer, and the index appreciated 2 points to 98. In April last year, wheat averaged 4s. 4d., barley 7s. 11d. and oats 5s. 11d. per cwt., the indices being 57, 103 and 84 respectively.

Live Stock.—Prices for fat cattle were a little higher during the month under review, the average for second quality advancing by 8d. to 31s. 7d. per live cwt., but as the rise in April, 1911-13, was relatively more pronounced, the index declined 2 points to 86, as compared with a fall from

MISCELLANEOUS NOTES

99 to 95 a year ago, when the average price was 34s. 7d. (The effect of adding the payment of 5s. per live cwt. would be to raise the April index to 100.) Values for fat sheep were slightly lower during April, but since a proportionately greater fall occurred in the base period, the index moved upwards by 2 points to 141, as against a rise of 10 points to 128 at the corresponding period last year. In the case of fat pigs prices have continued to decline: second quality bacon pigs were 7d. cheaper at an average of 10s. 10d. per score, and this was reflected in a further fall of 6 points in the index to 108. Porkers were 10d. per score less at 11s. 11d. and the index was 7 points lower at 113. Dairy cows were cheaper than in the preceding month, and the index was 2 points lower at 99. Store cattle, however, were dearer, but the index at 85 was 1 point lower in consequence of the proportionately greater increase in prices between March and April of the base years. Decreases were noticeable also in the prices of store sheep and pigs, and the indices were 6 and 8 points lower at 107 and 122 respectively.

Dairy and Poultry Produce.—The index for milk rose by 54 points to 215 on account of the April regional contract price for liquid milk being retained at the same figure as in March, instead of falling, as in previous years and the base period, from winter to summer level. A year ago the index for milk was 168. Butter was cheaper during April, but the index rose 1 point to 89, while cheese was unaltered either in price or index. Egg prices have pursued the usual seasonal course, but the decline of about $\frac{3}{4}$ d. per dozen was less pronounced than in 1911-13, and the index rose 2 points to 96; in April, 1934, the index was 99. Prices of fowls and ducks were higher, but the combined index for poultry at 116 was 8 points lower, because of the greater rise in price in the base period.

Other Commodities.—Potatoes were only 1s. per ton dearer than in March, but as there was a rise of 12s. 6d. in April of the base years, the index declined 13 points to 95, which was 6 points above the figure recorded a year ago. Hay was cheaper on the month, the index depreciating 4 points to 99, and the index for vegetables fell by 23 points to 116. Quotations for wool showed no change, and the index at 83 remained the same as in March.

MISCELLANEOUS NOTES

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity	1933	1934	1935			
	April	April	Jan.	Feb.	Mar.	April
Wheat ...	68	57	65	63	62	64
Barley ...	82	103	101	101	95	93
Oats ...	81	84	100	99	96	98
Fat cattle...	100	95	95	91	88	86
„ sheep...	116	128	140	134	139	141
Bacon pigs	112	125	117	120	114	108
Pork „	116	126	128	125	120	113
Dairy cows	106	103	105	102	101	99
Store cattle	99	84	87	84	86	85
„ sheep	84	95	111	109	113	107
„ pigs	123	137	151	142	130	122
Eggs ...	93	99	95	96	94	96
Poultry ...	124	119	121	124	124	116
Milk ...	153	168	171	171	161	215
Butter ...	91	91	83	86	88	89
Cheese ...	111	117	97	94	91	91
Potatoes ...	87	89	121	116	108	95
Hay ...	66	80	101	102	103	99
Wool ...	62	96	88	87	83	83

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat ...	129	125	123 ^c	121	121	119
Fat Cattle...	—	—	110	105	102	100
General Index	109	116	124 ^c	122	119	126

* Superseding figures previously published.

Enforcement of Minimum Rates of Wages.—During the month ending May 14, 1935, legal proceedings were taken against five employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area.	Court.	Fines imposed.	Costs allowed	Arrears of wages ordered.	No. of workers involved.
Anglesey ...	Llangefni	£ s. d. 2 0 0	£ s. d. 1 1 0	£ s. d. 21 0 0	2
Kent ...	Tonbridge	30 0 0	—	20 17 1	3
Cardiganshire ...	Aberavon...	0 5 0	—	14 0 0	1
Yorks, N.R. ...	Malton ...	3 0 0	2 0 0	33 17 6	1
Yorks, W.R. ...	Leeds ...	8 0 0	2 0 0	43 13 11	2
		£ 43 5 0	5 1 0	133 8 6	9

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended May 15				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 7 12d	£ 7 12d	£ 7 12d	£ 7 12d	s. d. 9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	7 5d	7 5d	7 5d	7 5d	7 0
Calcium cyanamide (N. 20.6%) ..	7 5s	7 5s	7 5s	7 5s	7 0
Kainite (Pot. 14%) ..	3 0	2 14	2 12	2 14g	3 10
Potash salts (Pot. 30%) ..	4 11	4 6	4 4	4 6g	2 10
" (Pot. 20%) ..	3 12	3 6	3 3	3 6g	3 4
Muriate of potash (Pot. 50%) ..	7 4	6 16	6 12	6 16g	2 9
Sulphate, " (Pot. 48%) ..	8 3	7 18	7 12	7 18g	3 3
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16k	3 6
" (S.P.A. 13½%) ..	2 15	2 11	2 15f	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 15f	6 7	..
Steamed bone-flour (N. ½%, P.A. 27½-29½%) ..	5 12	5 12	5 10f	5 10	..

Abbreviations ; N. = Nitrogen ; P.A. = Phosphoric Acid ; S.P.A. = Soluble Phosphoric Acid ; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

§ Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

α Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

α Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater ; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails ; southern rails 2s. 6d. extra.

k Prices shown are f.o.r. northern rails ; southern rails, 1s. 3d. extra.

APPOINTMENTS

County Agricultural Education Staffs ENGLAND

Leicestershire.—Mr. L. J. Shelley has been appointed County Poultry Instructor, *vice* Mr. H. T. Atkinson, N.D.P., deceased.

Northamptonshire.—Mr. F. R. Melvin, N.D.D., has been appointed Assistant Instructor in Dairying, *vice* Mr. A. T. G. Trew, N.D.A., N.D.D.

SOME WIRELESS TALKS TO FARMERS

Sussex (West).—Mr. G. H. Hughes, N.D.A., N.D.D., B.D.F.D., has been appointed Instructor in Dairying.

Wiltshire.—Miss M. E. Cumming, N.D.D., has been appointed Agricultural Instructor.

WALES.

Cardiganshire.—Mr. Gwilym M. Jones has been appointed Horticultural Instructor, *vice* Mr. W. Lewis, F.R.H.S., deceased.

Denbighshire.—Mr. D. S. Edwards, B.Sc., has been appointed Assistant Organizer and Lecturer in Agricultural Science, *vice* Mr. Emrys Davies, B.Sc.

Staffs of Agricultural Colleges

Midland Agricultural College, Sutton Bonington.—Mr. H. G. Robinson, M.Sc., has been appointed Principal of the College, *vice* Dr. T. H. Milburn, deceased.

Studley College, Warwickshire.—Miss J. T. Cook, N.D.P., has been appointed Assistant Lecturer and Demonstrator in Poultry Husbandry.

Some Wireless Talks to Farmers in June

<i>Date : June</i>	<i>Station</i>	<i>Time</i>	<i>Speaker</i>	<i>Subject</i>
5	National	6.45 p.m.	Professor J. A. Scott-Watson	Topics of the moment
12, 19, 26	"	6.45 p.m.	Mr. John Morgan	Experiences during his recent Scandinavian tour
13	West	6.30 p.m.	A Discussion between Messrs. A. W. Ling and E. Carstairs	Large-scale power farming
17	"	9. 0 p.m.	Various	The Farming Year
27	"	6.30 p.m.	Messrs. A. W. Ling and W. Limbrick	General Impressions of the Shows — Bath and West, Three Counties, etc.
28	North	8. 0 p.m.	Mr. A. C. Gregg	Fruit-growing in the North
6	Scottish	6.30 p.m.	Professor James Ritchie	Maggot Fly on Sheep
14	"	6.50 p.m.	Mr. Joseph F. Duncan	For Scottish Farmers in particular
18	"	7.20 p.m.	Details not yet available	The Highland Show
19	"	6.30 p.m.		
20	"	6.30 p.m.		
21	"	10.10 p.m.		
28	"	Time not yet fixed	Mr. Joseph F. Duncan	For Scottish Farmers in particular

NOTICES OF BOOKS

"The Feathered World" Yearbook, 1935. Ed. by O. Comyns Lower and A. P. Thompson. Pp. 594. (London: "The Feathered World," 9, Arundel Street, W.C.2. Price 2s.)

With the present issue this well-known annual completes its twenty-fourth year. Its contents cover a wide range of interests, the subjects discussed including the chemistry of the egg, a description of some Continental poultry methods, by Dr. R. T. Parkhurst, notes on battery brooding, ornamental waterfowl, trapnesting, farm accounts, and a large number of articles by specialists dealing with various breeds of poultry, pigeons and ducks. Mr. S. H. Lower contributes an introduction, reviewing the events of the past twelve months. Sir Edward Brown also writes on "The Poultry Industry in 1934." In addition to lists of county poultry instructors, specialist clubs and other useful data, there are numerous illustrations representing practically every breed of fowl, bantam, pigeon and duck.

Merchandise Marks Laws and Regulations. By A. S. Harvey. Pp. viii + 277. (London: Sir Isaac Pitman and Sons, Ltd. 1934. Price 7s. 6d.)

The object of this work is, as stated in the preface, to set forth the main body of laws and regulations governing merchandise marks throughout the British Empire, and in the principal foreign countries concerned. References are made in the text to the principal enactments, regulations and Government publications utilized, so that the complete text of these documents may be the more readily consulted.

As regards agricultural, horticultural and fishery products, the volume includes comprehensive information regarding existing statutes and regulations affecting such commodities in relation to the application of marks, and in particular in connexion with the Merchandise Marks Acts, 1887-1926, and the various schemes for grading and marketing agricultural produce consequent on the Agricultural Produce (Grading and Marking) Acts, 1928 and 1931, and the Agricultural Marketing Act, 1931. In the main, however, the book is of general rather than of particular agricultural interest.

Imperial Agricultural Bureaux: Vth Annual Report of the Executive Council, 1933-34. Pp. 51. (London: His Majesty's Stationery Office. Price 4s.)

The Council of Imperial Agricultural Bureaux now controls the Imperial Institutes of Entomology and Mycology, the Insect Parasite Laboratory at Farnham Royal, and the Stored Products Research Laboratory, as well as the eight bureaux responsible for the collection and dissemination to scientific workers of information concerning various branches of agricultural research. This Report contains a detailed account of the activities of the four institutions named above, and a general review of the work of the bureaux and connected organizations during the year.

The National Farmers' Union Yearbook for 1935. Edited by C. Fyfe, C.B.E. Pp. 520. (London: National Farmers' Union, 45, Bedford Square, W.C.1. Price 5s.; 5s. 4d. post free.)

This well-known annual provides a great deal of information on various subjects for farmers and others who are interested in agricultural matters. A chapter dealing with the legislation of the past year includes summaries of the Cattle Industry (Emergency Provisions) Act and other important measures, while the statistical chapter, always a valuable feature, contains a memorandum dealing with the operation of the quantitative regulation of agricultural

NOTICES OF BOOKS

imports, with an historical note on the subject. Other interesting contributions are Mr. James Wyllie's article on "Farm Management Records," and a chapter on the operation of the several Marketing Schemes now in force, the material for which was supplied by the Boards themselves. An additional section gives the personnel of the Boards and of the Marketing Boards Co-ordinating Committee. Such matters as agricultural education, research, income-tax, tithe, land tax, railway rates and charges, fertilizers and feeding stuffs, are also covered, and the facts are made readily accessible by means of an efficient index.

Agricultural Progress. Vol. XII. Pp. 204. (Cambridge: W. Heffer & Sons, Ltd. 1935. Price 5s.)

The current issue of the Journal of the Agricultural Education Association opens with a symposium on "Aspects of Agricultural Reconstruction," the contributors being Professors A. W. Ashby and J. A. S. Watson, Dr. K. A. H. Murray, Miss R. Cohen, C. S. Orwin and G. Crowther. This is followed by sections dealing with Animal and Crop Husbandry, Dairying, Economics and Education, each containing articles by well-known writers on their respective subjects. The number concludes with notes, reviews of books, and a record of the recent activities of the Association.

The British Goat Society's Yearbook for 1935. Pp. 179 and 58 figs. (Compiled and issued by the Secretary, H. E. Jeffery, Roydon Road, Diss, Norfolk. Price 1s. 6d.)

The fifteenth issue of this publication maintains the standard set in previous years. In an introductory note the President, Dr. B. D. Z. Wright, points out that the year has been remarkable for the breaking and making of records. The highest daily yield now stands at 22 lb. 7 oz., while a new annual record of 5,306 lb. 1 oz. has been established. Mr. H. S. Holmes Pegler contributes interesting reminiscences under the title "The Diamond Jubilee of Goat Shows"; at 87 he is acting as Honorary Treasurer of the Society which he founded in 1879. Dr. H. J. Brooks writes on "The Efficiency of the Goat for Milk Production," with reference to feeding. Dr. J. A. Asdell has an interesting article on "Goat Research in 1934." The various breeds, goats in India and the Netherlands, sterility, milk distribution, and rearing lambs on goats' milk, are among the subjects discussed in this publication, which will be found useful by all who are concerned with goats.

Dictionary of Terms relating to Agriculture, Horticulture, Forestry, Cattle Breeding, Dairy Industry and Agriculture in English, French, German and Dutch. Compiled by Prof. T. J. Bezemer, State Agricultural College, Wageningen, Holland. Pp. vii + 251 + 294 + 267 + 249. (London: George Allen & Unwin. 1934. Price 25s.)

Even the more familiar of the European languages present some difficulties when the reader is studying a specialized subject, and the increase of terminology arising out of the spread of knowledge adds to these difficulties. Sometimes, indeed, it is not easy to find an exact equivalent for a simple word. To provide a means of overcoming this obstacle in understanding the precise nature of work being done in other countries many technical dictionaries of a polyglot type have already been produced, but Prof. Bezemer's compilation is the first to deal with agriculture and its kindred industries.

In this compilation Prof. Bezemer has had the benefit of the advice and assistance of his colleagues at Wageningen, an agricultural school of international repute. There is thus every guarantee that the work has been well done and is adequate to the general purposes of the students who will use it.

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As far as the English section is concerned a careful examination has failed to reveal any striking deficiencies, but no doubt when it has been more widely used some suggestions will offer themselves. The editor explains that he makes no claim to completeness, and that, on the score of economy, it has been imperative to make a selection of the words to be included. He would, however, be grateful to users for suggestions, either with regard to words omitted, or to what they consider to be incorrect equivalents. In this connexion it may perhaps be pointed out that the equivalent given for the English word "yard" is based upon an archaic usage, and that the modern word is used to designate the farmyard, an open space adjoining the buildings.

The Genetics of Garden Plants. By M. B. Crane and W. J. C. Lawrence. Introd. by Sir Daniel Hall. Pp. xvi + 236. 53 figs. and 42 tables. (London: Macmillan & Co., Ltd. 1934. Price 10s. 6d.)

The scientific problems of breeding plants cultivated by man have long passed the stage of being of academic interest alone. It has been shown again and again that breeding by tested methods, having a logical theoretical basis, yields the desired results with a great reduction in time and money when compared with the haphazard empiricism of days before the Mendelian principles were common knowledge. Genetics, however, is a subject that is increasing our knowledge of plants and animals so rapidly, and its literature is now so vast and scattered, that the need for a series of authentic textbooks dealing with special aspects is obvious. Fortunately, some of these have now been supplied in a convenient form and at reasonable prices.

Genetics must make a special appeal to the horticulturist. Not only was Mendel's original classical research concerned with the garden pea, but many other garden plants have been the subjects of study that has led to great recent scientific advances. There has, however, been a distinct need for a summary of modern genetical investigations on our common garden flowers, fruits, and vegetables. Messrs. Crane and Lawrence are to be congratulated on a work that should largely meet this need and yet stimulate the reader to ask for more. The authors have themselves contributed largely to the researches they summarize, and the book is therefore no mere compilation.

The ten chapters deal with the general genetics and cytology of diploid and polyploid plants, with the genetical histories of selected flowering and ornamental, vegetable and salad plants, and fruits, with bud-sports, and with such eminently practical subjects as incompatibility, sterility, and the origin of new and improved forms. The volume is furnished with a glossary, a long bibliography, and an index.

Notes on the Technique of Mechanical Farming. By J. E. Newman. Pp. 44 and 4 figs. Institute for Research in Agricultural Engineering. (Oxford University Press. 1934. Price 1s. 6d.)

Since 1930 the Institute for Research in Agricultural Engineering, in co-operation with the Institute of Agricultural Economics Research at Oxford, has been conducting a survey of mechanized farms. In the first year, the survey covered seven farms, but it now includes twenty, representing a wide diversity of farming conditions. This bulletin is the result of this survey from the mechanical standpoint, and gives an account of the methods and machinery of certain farmers who are adapting the science of engineering to the practice of agriculture.

The wide range of machines and implements now available to the farmer engaged in mechanized farming is well illustrated by the diversity of examples described, and the range is added to by the many ingenious adaptations worked out by some of the farmers themselves. Mr. Newman discusses the several types of tractor em-

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ployed for different jobs, and the various uses to which old high-powered motors have been put both for traction and transport.

Methods of drilling on the farms covered by the survey vary widely, and, from the observations he has made, Mr. Newman points out that there are some disadvantages to be encountered in the use of the combined fertilizer and seed drill. The combine-harvester, so often of late assumed to be the sign of a mechanized farm, receives detailed treatment in a long extract from the late G. H. Neville's speech at last year's Conference on Power Farming at Harper Adams College.

As general results of the survey up to date, the Institute is able to state that the mechanized farms under record are now directly and indirectly employing more labour than the land carried before its equipment was mechanized; that most of the farms, which started as purely specialized units for the production of one commodity, are now "diversifying" on an increasing scale; and that their yields are as good as or better than those of farms run on more traditional lines.

Perhaps the most interesting fact about this publication is that it is a record of what progressive farmers are actually doing instead of the theories which form so much of agricultural writing, and, if others wish to learn from the practices of their contemporaries, this bulletin will help them to do so.

Sexing Day-Old Chicks. By W. P. Blount, F.R.C.V.S. Pp. 54. (London: "Poultry World," Ltd. 1934. Price 2s. 6d.)

To the practical poultry keeper the commercial advantage of sexing chicks at hatching will be obvious, because male and female can be separated at birth and each accorded such special treatment as circumstances require. The art of sex determination in day-old chicks by examination of certain physical characteristics, other than by the sex-linked method which involves the mating of two distinct breeds, is no new discovery: it has long been known to scientists. The exploitation of this method of solving the sexing problem, however, is due mainly to the work of certain Japanese veterinary and poultry experts, who within the last few years have developed the art to a very high degree of proficiency: expert operators can now sex day-old chicks with great speed and accuracy.

A number of Japanese and other sexing experts are at present working for some of the large hatcheries in this country, and classes and demonstrations are being arranged at hatcheries and at a few of the county agricultural farm institutes and colleges for the purpose of teaching students and poultry keepers the practice of "sexing." With the rapidly-awaking interest of the poultry industry in matters of sex determination Mr. Blount's book should prove of definite value, and cater for the need of poultry breeders who wish to make themselves proficient in a practice that may eventually become of considerable importance to the industry in the future.

Averages of Bright Sunshine for the British Isles for Periods ending 1930. Pp. 41. (London: His Majesty's Stationery Office. 1934. Price 1s.)

This publication, issued by the Meteorological Office, Air Ministry, contains two main tables, the first of which gives average monthly totals, daily means and percentages of possible duration of sunshine for all stations having 10 years or more of observations in the period 1901-1930. The second table gives for eighteen selected stations the average and percentage number of days in each month with sunshine within stated limits of duration.

The total number of stations for which averages are printed is 172, of which 31 are in Scotland and nine in Ireland. For most stations the records cover a period of 20 years or more. The effect on the averages, of variations in the number of years used, is illustrated by tables in the introduction.

The data show that the average annual duration of recorded sun

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shine varies from over 1,800 hours in the Channel Isles and on the south coast of England to under 1,100 hours in the Shetlands and in certain industrial areas where heavy smoke pollution occurs. At all stations May or June is the sunniest month, and December or January the dulllest.

Le Métayage: Ce qu'il faut en savoir. By P. Rouveroux. Pp. 309. Illus. (Paris: Librairie Agricole de la "Maison Rustique," 26 rue Jacob (VIe.) 1934. Price 12 fr.)

M. Rouveroux gives a very interesting and detailed account of the history and practice of metayage in France. Metayage is, in brief, a mode of tenure whereby, instead of paying a fixed rent, the tenant hands over to the landlord a fixed proportion of his annual produce. On the eve of the Revolution, according to some writers, as much as seven-eighths of the cultivated land in France was occupied by metayers. The system, however, was strongly criticized by Arthur Young and other prominent agriculturists of the period, and in many districts practically vanished after the Revolution. It continues to flourish, however, in certain provinces, and in 1892, the date of the last returns, about 11 per cent. of the farms in France were held on some system of metayage. Apart from a brief reference in the Civil Code, metayage was not made the subject of legislation until 1889, and as a result it has assumed various forms in different parts of the country, and is largely regulated by local custom. The various main types of contract are considered in detail by the author.

While the high prices after the War tended still further to reduce the area under metayage, the slumps of recent years have led to a revival, and there are many arguments in favour of a system that automatically varies the cash value of the rent payable in accordance with the rise and fall of agricultural prices. The system engenders a closer relationship between landlord and tenant, and gives the landlord a real interest in the cultivation of his land and the life of the rural community. The importance of metayage in the French system of land tenure is considerable, and may well increase in the future, and Mr. Rouveroux' book is well worth studying both from the historical and from the practical point of view.

Wages in Eighteenth-Century England. By Elizabeth W. Gilboy. Harvard Economic Studies. No. XLV. Pp. xxix + 297. (London: Humphrey Milford. 1934. Price 15s.)

American scholars are to be envied for the facilities available to them for carrying out their work and for securing the publication of their results: but when the scholarship is of the quality of that of Mrs. Gilboy there is no justifiable ground for jealousy.

Studies of wages are necessarily complex and rarely tell the whole story of the condition of the class earning the wages, and although Mrs. Gilboy has been fortunate in tapping new sources of information it is doubtful whether her study is the final word on the subject. She admits as much herself. She has, however, collected both the old and the new material in a pleasing juxtaposition, and has told her story clearly.

The condition of the labourer has occupied the attention of many scholars, but few have been able to draw so complete a picture as that here presented. Not only does Mrs. Gilboy supply a considered criticism of the pamphlet literature on which nearly all writers on the subject have hitherto been forced to rely, but she confronts its limitations and partiality with the definite facts she has accumulated from the Sessions Papers and other sources. The actual statements of wage rates are illuminated, not only by actual and imaginary budgets of labourers' families, but by incidental evidence derived from losses of goods by theft, fire and other accidents as well as their transfer on the death of owners.

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It is to be feared, however, that some of the evidence cited must be ruled out. Mrs. Gilboy is American, and is inclined to confuse the terminology used by the people of a past century in England. For instance, a man described as a husbandman for probate purposes is unlikely to have been a labourer. He would have been a farmer, and his inventory of goods is likely to have been more ample than that of any wage-earner.

Again, in the attempt to assess the benefits derived from labour Mrs. Gilboy places far too great emphasis on perquisites. Allowances of beer or cider were heavy at some seasons of the year, but it is doubtful whether they had much dietetic value either in that season or at any other time. The giving of small presents either for good will, or because of illness, unemployment and so on is a commonplace of a semi-patriarchal system of society, but the mere uncertainty of their incidence robs them of much of their value.

In the result, therefore, Mrs. Gilboy is perhaps a little too optimistic; but even if she is, she has accumulated a mass of data which has hitherto only been available in disjunctive form, and students of the social conditions of farmers and their employees will be by so much the more grateful to her.

The Internal Parasites of Domestic Animals: A Manual for Veterinary Surgeons. By Prof. T. W. M. Cameron, McGill University, Canada. Pp. xii + 292, 144 figs., 17 plates, 6 tables. (London: A. & C. Black, Ltd. 1934. Price 15s.)

Our knowledge of animal parasites has been advancing very rapidly of late, and this doubtless accounts in large measure for the fact that no comprehensive textbook has appeared on the subject of veterinary helminthology for the past twenty-four years. When many workers have made their contributions to the knowledge of a subject and their findings have been confirmed, and collected by workers in the various branches, there comes a time when a textbook can be written, and it frequently happens that the appropriate time is simultaneously recognized by different authorities in a subject, and two or more manuals appear. This is instanced very well by the several books of a more or less comprehensive nature that have recently been published in human and in veterinary parasitology; Mönnig's book on "Veterinary Helminthology and Entomology" appeared only a few weeks before Cameron's book, and it is understood that at least one other, from a different quarter, is in the course of preparation.

An idea of the scope of Cameron's book may be gathered from the following note of the number of pages allotted to each part:—"Introduction to Parasitology," 9 pages; "The Protozoa," 30 pages; "The Helminths," 169 pages; "Immunity and Serology," 20 pages; "Therapeutics of Helminthic Infections," 8 pages, "Technique," 23 pages; and "Host Lists and Bibliography," 16 pages.

A tremendous amount of information is crammed into the short section dealing with the protozoa and will be very valuable to those who, although not particularly concerned with the subject, wish to have a brief review of modern veterinary protozoology. It will be seen, however, that the main part of the book deals with the commoner and more important worm parasites of the cat, dog, fowl, horse, pig, ox and sheep. Each of the three main sections on roundworms, tapeworms and flukes, commences with an account of the classification of the worms they include and is followed by descriptions of genera and species, illustrated by diagrams and photomicrographs.

The account of disease causation by the various species, and the diagnosis and the prevention of disease, is brief, and the mention of specific treatments is almost entirely confined to a short table in the section on therapeutics.

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From the student's and the general worker's point of view the book represents a great advance on the textbooks that have been available, and a very useful amount of information can be obtained at a moderate price.

Black's Veterinary Dictionary. Edited by W. C. Miller, M.R.C.V.S., F.R.S.E. Second Edition. Pp. xiv + 1141. (London: A. & C. Black, Ltd. 1935. Price 21s.)

This dictionary was originally compiled to act as a guide principally for the stockbreeder and owner who have ordinarily little means of obtaining satisfactory information regarding diseases of animals and allied subjects in a concise and handy form. The second edition of this work that has now been published continues on these lines, with additional information embodied in an appendix. The work will be found to be of material assistance to owners of stock who desire the welfare of the animals under their care and who require reasoned rather than empirical information. Praise is due to the publishers for the clearness of the print and the excellence of the illustrations.

Our Country's Wild Animals: By H. Mortimer Batten. Pp. vii + 108, and 20 figs. (London: T. Nelson & Sons, Ltd. Price 3s. 6d.)

This little book, like its recent predecessor from the pen of this well-known naturalist, is both competent and interesting, and we cordially commend it to the notice of the field naturalist, whether tyro or experienced observer. Each chapter provides evidence of first-hand and intimate knowledge of the subject portrayed, and the photographs are, as usual, first-rate.

When discussing the otter, the author correctly stresses the facts that the damage done by this agile and accomplished nomad of the streams has been exaggerated in some quarters, and that the otter has not been given due credit for its good work in the eradication of eels from valuable salmon and trout waters. In our opinion, eels form a very considerable portion of the otter's normal diet. As to the home life of this animal, we confess to some surprise at the author's statement that he has never seen an otter "slide" in this country.

The author's views on the hedgehog are fair and well balanced, and, as he says, this animal makes one of the most useful and interesting of garden pets, whatever may be its habits elsewhere. We think, however, that Mr. Batten might well have made a greater point of the undoubted fact that the hedgehog is eminently an outdoor retainer. For some reason, this animal disposes about its person more and larger fleas than any other of our acquaintance!

With regard to the life history of the hare, the author mentions the habit of leverets, when old enough to fend for themselves, of using separate "forms," but we notice no word of the interesting fact that the doe hare does herself quite commonly dispose her litter in separate batches.

The chapter on the common rat is both useful and informative. The weasel, as stated, is unquestionably one of the greatest foes of the brown rat, but although it is quite capable of killing an adult, it is probable that its attacks are confined mainly to the young, and that it rarely attacks a grown rat from choice.

All these, however, are minor points, and are in no wise designed to detract from the merit of a valuable and well-written book. The host of other creatures discussed are fully and competently dealt with, and the book is as good value at the price as any nature lover is likely to obtain.

SELECTED CONTENTS OF PERIODICALS

Agriculture, General and Miscellaneous

- The Agriculture of Essex. *J. C. Leshe* and *D. J. Ewing*. (Agric. Progr., 12 (1935), pp. 73-81.)
- The Agriculture of Cumberland and Westmorland. *J. H. Faulder*. (Agric. Progr., 12 (1935), pp. 67-73.)
- Man and Horse Work on Devon and Cornish Farms. *W. H. Long*. (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 23-37.)
- The Position and Problem of the Farm Worker in England and Wales. *A. W. Ashby*. (Int. Lab. Rev., 31, 3 (March, 1935), pp. 311-343.)
- Per Capita Wheat Consumption in Western Europe. I Measurement, from 1885-86. (Wheat Stud., Stanford Univ., 11, 7 (March, 1935), pp. 255-305.)
- Notable Farming Enterprises. V. I Two Decades of Light Land Farming (Parker & Proctor). *F. Rayns*. II Mr. J. C. Robinson's Farms at Iford. *H. G. Robinson*. (Jour. Roy. Agric. Soc., Eng., 95 (1934), pp. 117-145.)
- Agricultural Administration in Scotland during the Present Reign. *Sir R. Greig*. (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 107-120.)
- Starch and Flour Quality. *C. L. Alsberg*. (Wheat Stud. Stanford Univ., 11, 6 (Feb., 1935), pp. 229-254.)
- Industrial Fatigue on the Farm *R. C. Andrew*. (Agric. Progr., 12 (1935), pp. 170-174.)
- Sur l'emploi des pneumatiques en agriculture. *G. Coupan* et al. (C. R. Acad. Agric. Fr., 21, 13 (3 Avril, 1935), pp. 562-568.)
- Applications of Chemistry in Modern Agriculture. *E. J. Russell*. (Jour. Soc. Chem. Ind., Lond., 54, 15 (12 April, 1935), pp. 325-327.)
- The Land Utilization Survey of Britain. *F. G. Morris*. (Agric. Progr., 12 (1935), pp. 148-152.)
- A County Scheme of Agricultural Education. *J. C. Leshe* (pp. 51-57). The Farm Institute as an Adjunct to the County Scheme of Agricultural Education. *W. A. Stewart* (pp. 58-59). The Revision of the Scheme of Agricultural Education as it affects University Teaching and Research. *N. M. Comber* (pp. 60-66) (Agric. Progr., 12, 1935.)
- Growth Forms: Genecology and its Agricultural Significance. *J. W. Gregor* and *F. R. Horne*. (Agric. Progr., 12, (1935), pp. 89-98.)
- The Transition from Woodland and Moorland to Grassland in the Spey Valley and Elsewhere. *E. W. Fenton*. (Jour. Ecol., 23, 1 (Feb., 1935), pp. 56-68.)
- The Royal Botanic Gardens, Kew, and Empire Agriculture. *H. C. Sampson*. (Jour. Roy. Soc. Arts, 83, 4295 (March 15, 1935), pp. 404-419.)

Agricultural Economics

- Planning, Control and Research in Agriculture after Recovery. *J. D. Black*. (Jour. Farm Econ., 17, 1 (Feb., 1935), pp. 20-38.)
- The Purchasing Power of Irish Free State Farmers in 1933. *J. Johnston*. (Econ. Jour., 44, 175 (Sept., 1934), pp. 453-459.)
- The Importance of Farm Accountancy for the Study of Certain Economic Problems in Agriculture. *J. Deslarzes*. (Int. Rev. Agric., Mon. Bull., Agric. Econ. Soc., 26, 2 (Feb., 1935), pp. 41-54) and 26, 3 (March, 1935), pp. 108-117.)
- Agriculture and the State. *P. R. Laird*. (Jour. W. Scot. Agric. Coll. Former Students' Club, 15 (1934-35), pp. 5-19.)

SELECTED CONTENTS OF PERIODICALS

- The Agricultural Policy in Action. *C. S. Orwin*. (Jour. Roy. Agric. Soc., Eng., 95 (1934), pp. 1-17.)
- Agricultural Reorganization and Price Control. *Ruth Cohen*. (Econ. Jour., 44, 175 (Sept., 1934), pp. 434-452.)
- Aspects of Agricultural Reconstruction, A Symposium: (1) The Milk Marketing Scheme. *A. W. Ashby* (pp. 7-16). (2) The Potato Marketing Scheme. *Ruth Cohen* (pp. 17-23). (3) The Pigs Marketing Scheme. *K. A. H. Murray* (pp. 24-34). (4) The Wheat Quota. *C. S. Orwin* (pp. 34-37). (5) The Cattle Industry (Emergency Provisions) Act, 1934. *J. A. S. Watson* (pp. 37-42). (6) Agricultural Reconstruction in the U.S. *G. Crowther* (pp. 43-50). (Agric. Progr., 12, 1935.)
- Measures for the Relief and Rehabilitation of Agriculture in Canada. *J. F. Booth*. (Jour. Farm Econ., 17, 1 (Feb., 1935), pp. 76-88.)

Soils and Fertilizers

- Action fertilisante de la magnésie. Nouvelles recherches. *Ch. Brioux et E. Jouis*. (Ann. agron., Paris, 5, 2 (Mars-Avril, 1935), pp. 190-204.)
- Action fertilisante de la magnésie. *Ch. Brioux et E. Jouis*. (C. R. Acad. Agric. Fr., 21, 11 (20 Mars, 1935), pp. 471-480.)
- A Survey of the Soils of the Teart Land Areas of Somerset—Progress Report No. 1. *D. A. Osmond*. (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 131-136.)
- Emploi du fumier artificiel dans la constitution des couches. *M. A. Demolon*. (C. R. Acad. Agric. Fr., 21, 14 (10 Avril, 1935), pp. 596-600.)
- Dehydration of Air in the Soil. *M. Aragou*. (Int. Rev. Agric. Mon. Bull. Agric. Sci. Pract., 26, 4 (April, 1935), pp. 169-175.)
- Reclamation and Cultivation of Peat Land at Lewis V. *W. G. Ogg and A. MacLeod*. (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 153-159.)
- Basic Slags and Mineral Phosphates. *E. M. Crowther*. (Jour. Roy. Agric. Soc. Eng., 95 (1934), pp. 34-53.)

Plant Pests, Diseases, etc.

- Fungus Diseases of Bowling and Golf Greens. *F. T. Bennett*. (Agric. Progr., 12 (1935), pp. 164-169.)
- The Eradication of Bracken by Cutting. *K. W. Braid*. (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 121-131.)
- Le mildiou et les sels de cuivre. *P. Viala*. (C. R. Acad. Agric. Fr., 21, 13 (3 Avril, 1935), pp. 568-570.)
- Further Studies of the Brown Rot Fungi VII. A Shoot Wilt in Stools and Layer Beds of Plum Stocks and its Relation to Wither Tip. *H. Wormald*. (Jour. Pomol., 13, 1 (March, 1935), pp. 68-77, 2 pl.)
- Quelques observations, sur les maladies du pied des céréales. *Et. Foex*. (C. R. Acad. Agric. Fr., 21, 12 (27 Mars, 1935), pp. 501-505.)
- Investigations on Chlorosis of Fruit Trees V. The Control of Lime-Induced Chlorosis by Injection of Iron Salts. *T. Wallace*. (Jour. Pomol., 13, 1 (March, 1935), pp. 54-67.)
- On the Transmission of the Strawberry Virus "Yellow-Edge" Disease by the Strawberry Aphis, together with notes on the Strawberry Tarsonemid Mite. *A. M. Massee*. (Jour. Pomol., 13, 1 (March, 1935), pp. 39-53, 3 pl.)
- Contribution à l'étude de la désinfection des céréales par l'eau chaude. *R. Vanderwalle*. (Bull. Inst. agron. Gembloux, 4, 1 (Feb. 1935), pp. 3-21.)
- The Control of *Phyllopertha horticola*, L., in Grassland. *C. L. Walton*. (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 140-148.)

SELECTED CONTENTS OF PERIODICALS

- The Effect of Calcium Cyanamide and of Formalin on Pea "Sickness." Progress Report. *C. L. Walton, L. Ogilvie and B. O. Mulhgan.* (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 137-140.)
- Popular Weed Killers. *M. A. H. Tincker.* (Jour. Roy. Hort. Soc., 60, 2 (Feb., 1935), pp. 68-79.)
- Lavender Pests. *H. F. Barnes.* (Jour. Roy. Hort. Soc., 60, 3 March, 1935), pp. 113-118, 3 pl.)
- The Use of Oil-Soluble Copper as a Fungicide. *E. R. De Ong.* (Phytopathology, 25, 3 (March, 1935), pp. 368-370.)

Field Crops, etc.

- Mechanical Treatment of Rough Hill Pasture. *R. G. Heddle and L. M. Walker.* (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 159-164.)
- The Management of Hill Pastures. *R. G. Heddle.* (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 148-152.)
- The Improvement of Grassland by Seeds and Manures. *R. G. Stapledon.* (Jour. Fmrs.' Cl., Lond., Pt. 3, 1935 (April), pp. 37-57.)
- The Management of Temporary Pasture. *W. M. Findlay.* (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 140-147.)
- The Wheat Policy of France since 1929. *H. Böker.* (Int. Rev. Agric. Mon. Bull. Agric. Econ. Soc., 26, 3 (March, 1935), pp. 97-108.)
- Thirty Years of Grassland Experiments at Saxmundham, Suffolk. *A. W. Oldershaw.* (Jour. Roy. Agric. Soc. Eng., 95 (1934), pp. 18-33.)
- Der Flachsbau. Seine wirtschaftliche Bedeutung, Anbau, Gewinnung und Verwertung. (Ber. ü. Ldw. (105, Sonderheft), 1935), (71 pp.)
- The Basket Willow Crop. *H. P. Hutchinson.* (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 169-176.)
- Vernalization of Perennial Plants—Grasses and Clovers. (Soviet Research). (Herb. Rev., 3, 1 (March, 1935), pp. 36-40 + 1 pl.)
- Contribution à l'étude des variations de la faculté germinative des semences au cours de leur conservation. *L. Bussard.* (Ann. agron., Paris, 5, 2 (Mars-Avril, 1935), pp. 249-277.)

Horticulture

- New Developments in the Heating of Glass-Houses. (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 184-185.)
- Culture du champignon de couche sur fumier artificiel. *A. Demolon, H. Burgevin et M. Marcel.* (C. R. Acad. Agric. Fr., 21, 11 (20 Mars, 1935), pp. 464-468.)
- A Study of the Variations in Leaf Shape and Petiole Length in Seedlings of "Paradise" Apples. *H. M. Tydeman.* (Jour. Pomol., 13, 1 (March, 1935), pp. 32-38.)
- The Composition of the Terminal Shoots and Fruits of Two Varieties of Apple in Relation to Rootstock Effects. *L. G. G. Warne and T. Wallace.* (Jour. Pomol., 13, 1 (March, 1935), pp. 1-31.)
- Experiments on the Improvement of the Juice from Culinary and Dessert Apples by Maceration with Pressed Bittersweet Pomace. Progress Report II. *P. T. H. Pickford.* (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 165-168.)
- A New Method of Fruit and Vegetable Preservation. The Metabolism of Apples. *M. Copisarow.* (Jour. Soc. Chem. Ind., Lond., 54, 13 (29 March, 1935), p. 283.)

Live Stock and Feeding

- Pig Husbandry Investigation. Interim Report. *W. T. Price*

SELECTED CONTENTS OF PERIODICALS

- and *A. W. Ling*. (Jour. Bath & W. & S. Count. Soc. Sixth Series, Vol. 9 (1934-35), pp. 49-55.)
- Shepherding Efficiency and its Effect on the Lamb Crop in Lowland Flocks. *J. F. H. Thomas*. (Jour. Fmrs.' Club, Pt. 2 (March, 1935), pp. 19-36.)
- Notes on the Cattle Situation in Scotland. *R. G. McClymont and A. Stewart*. (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 167-173.)
- Feeding and Management in Relation to Carcase Quality in Bacon Pigs. *H. R. Davidson*. (Jour. Roy. Agric. Soc. Eng., 95 (1934), pp. 146-153.)
- Some Substitutes for Swedes in Beef Production. *W. G. R. Paterson*. (Agric. Progr., 12 (1935), pp. 103-109.)
- The Composition and Feeding Value of Some Moorland Plants. *B. Thomas*. (Agric. Progr., 12 (1935), pp. 82-89.)
- The Spangenberg Process of Sprouting Maize for Fodder. Report by the Nat. Inst. Res. Dairying, Reading. (Int. Rev. Agric. Mon. Bull. Agric. Sci. Pract., 26, 2 (Feb., 1935), pp. 62-86.)
- The Present Position of Silage Making. *H. J. Page and S. J. Watson*. (Agric. Progr., 12 (1935), pp. 99-102.)
- The Conservation of Grassland Herbage. *S. J. Watson*. (Jour. Roy. Agric. Soc. Eng., 95 (1934), pp. 103-116.)

Poultry

- The Economic Value of Poultry on the Farm. *A. G. Ruston*. (Jour. Roy. Agric. Soc. Eng., 95 (1934), pp. 73-102.)
- The Cost of Pullet Production, 1933-34. (Harper Adams Util. Poult. Jour., 20, 5 (Feb.-March, 1935), pp. 200-203.)
- Management of the Laying Hen on the General Farm. *D. P. Wright*. (Scot. Jour. Agric., 18, 2 (April, 1935), pp. 131-139.)
- A Survey of the Poultry Industry in the North of England. *D. H. Dinsdale*. (Agric. Progr., 12 (1935), pp. 152-163.)

Dairying, etc.

- The Mount Hope Bull Index. *T. Scott*. (Agric. Progr., 12 (1935), pp. 127-135.)
- Slow Starters in Cheesemaking. *J. G. Davis*. (Agric. Progr., 12 (1935), pp. 138-144.)
- The Present State of Milk Recording throughout the World. *S. Taussig*. (Int. Rev. Agric. Mon. Bull. Agric. Sci. Pract., 26, 2 (Feb., 1935), pp. 86-112.)
- The Present State of the Dairying Industry in Various Countries: (2) Italy. *E. Gasser*. (Int. Rev. Agric. Mon. Bull. Agric. Sci. Pract., 26, 4 (April, 1935), pp. 197-210.)
- The Influence of Milking Machines on Milk Yield. *S. Bartlett and S. L. Huthnance*. (Agric. Progr., 12 (1935), pp. 144-147.)
- The Need for Amplification of the Methods of Testing for Coliform Organisms in Milk. *A. T. R. Mattick and E. R. Hiscox*. (Agric. Progr., 12 (1935), pp. 136-137.)

Veterinary Science

- Diseases of Sheep. *A. Brownlee*. (Agric. Progr., 12 (1935), pp. 118-123.)
- Avitaminosis A in Pigs. *J. Golding and A. S. Foot*. (Agric. Progr., 12 (1935), pp. 123-126.)
- Two Important Sheep Diseases in the Northern Province. *W. L. Stewart*. (Agric. Progr., 12 (1935), pp. 110-117.)
- The Survival of Avian Coccidia in Soil. *J. P. Delaplane and H. O. Stuart*. (Poult. Sci., 14, 2 (March, 1935), pp. 67-69.)
- Some Notes on the Biology and Physiology of the Sheep Blowfly, *Lucilia Sericata*, Meig., *A. C. Evans*. (Bull. ent. Res., 26, 1 (March, 1935), pp. 115-125.)

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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NOTES FOR THE MONTH

Trench Silage

THE haymaking season is with us; and, although, at the time of writing, the rainy weather has given place to a spell of heat, there is no certainty of dry, sunny conditions continuing. Farmers with "seeds," lucerne, oat and tare mixtures, and similar crops, should be prepared, if necessary, to make silage instead of hay.

For those who have no special silos the trench system of ensiling forage crops is probably the most efficient substitute. There is good reason to believe that trenches are superior both to clamps and to stacks for making silage from ordinary green material. The object of making a trench silo is two-fold. First, a larger mass of material can be stored in one bulk; second, the soil around prevents waste on the sides by drying and excludes the air, thus reducing fermentation. The waste with stack silage by drying out of the sides is sometimes very great. Moreover, over-heating frequently occurs in stacks and results in a great reduction in the digestibility of the protein. This loss in a trench, where over-heating seldom takes place, is comparatively small.

The site of the excavation should be well drained. Trenches 36 ft. long, 12 ft. wide and 4 ft. 6 in. deep have been dug at a cost of £4 to £5. There are records of trenches being in regular use for 45 years without deterioration.

Size of Trench.—If the trench is made 12-15 ft. wide, a cart can safely be drawn over the heap until a height of 8 or 10 ft. above ground level is reached. Depth 4-4½ ft. As a rough guide, the length of a trench that is 14 ft. wide

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and 4 ft. deep should be about $1\frac{1}{2}$ yd. for each acre of oats and tares to be ensiled.

Drainage.—On light, sandy or chalky land, surface-water will generally soak away. On all but the lightest soil, however, water is apt to accumulate in the trench when it is partly empty—this will rot any silage that it reaches. In such circumstances, one end of the trench should be slightly lower than the other. A drain should lead from this end to a convenient outfall, and when removing the silage a start should be made at the lower end.

Filling the Trench.—Green material may be put into the trench immediately it is cut, even when rain is falling. Wet weather when filling, however, results in very sour silage. Material that is not very succulent is probably best put into the trench immediately it is cut, but preferably when dry to the touch. Very succulent material is usually best wilted for a day. The green stuff is not chaffed but is ensiled in the long state. After tipping in a few loads it will be possible to use a horse for trampling. Later, the carts, both full and empty, should be drawn over the green material; consolidation prevents loss. When the silo is full to ground level a few stakes 7-8 ft. long may be placed upright on the edges of the trench as guides to prevent the green material overlapping the soil on the sides of the trench. More material is then added, the walls being very slightly drawn in, until the heap is several feet above ground level. A slope of green stuff is made at each end to allow the carts to ascend and descend. The green material sinks considerably from day to day and an interval of a day during filling is useful, as it allows the heap to settle.

The heap must be well rounded up to finish off. The sloping ends should be cut off and placed on the top, and if a few loads of inferior material are also available for topping up, wastage will be minimized.

The excavated soil should be thrown on the top to a depth of 6 or 8 in., and to keep the soil in position poles should be placed near the outer edges and held in place by connecting wires.

Single copies of the Ministry's Advisory Leaflet, No. 243, *Making Silage without Buildings*, will be sent free, and post free, on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Wheat Act, 1932: Report of Standard Price Committee

THE Report of the Standard Price Committee, under the Chairmanship of Sir John Beale, K.B.E., which was appointed under Section 2 (3) of the Wheat Act, 1932, by the Minister of Agriculture and Fisheries, the Secretary of State for Scotland and the Secretary of State for the Home Department, was published on June 20.

In accordance with the Statute, the Committee were asked to consider general economic conditions and the conditions affecting the agricultural industry, and to report to Ministers as to the desirability of making any alteration in the "standard price" of home-grown wheat. The standard price is defined in Section 2 (3) of the Act as the price of 10s. per cwt. equivalent to 45s. per quarter of 504 lb.

The Committee have reached the unanimous conclusion that it is undesirable at the present time to make any alteration in the standard price. As far as general economic conditions are concerned, the Committee find there has been some improvement since 1932, notably in this country, and that there is to-day less danger of sudden disturbances in the course of world prices than was the case when the Wheat Act was passed; more confidence can now be placed in the stability of sterling prices than was possible in 1932; and though there has been little change in the purchasing power of the pound since that date, such change as has occurred represents an increase in purchasing power, with the result that, in conjunction with improved employment, the condition of the wage-earning classes has improved.

As regards the conditions affecting agriculture, the Committee find that the acreage under wheat in this country has been restored to the pre-War average, that the position of the farmer, particularly in the Eastern Counties, has been ameliorated in the last few years, largely due to the deficiency payments made under the Act, and that agricultural wages in the wheat-growing areas have shown an improvement which goes beyond that shown elsewhere.

In the Committee's view, a reduction in the standard price at the present time would add to the difficulties of the farming community, despite the remedial measures of the last few years, and would have an adverse effect upon agricultural wages in the wheat-growing areas.

Owing to the statutory limitation to 27,000,000 cwt. of

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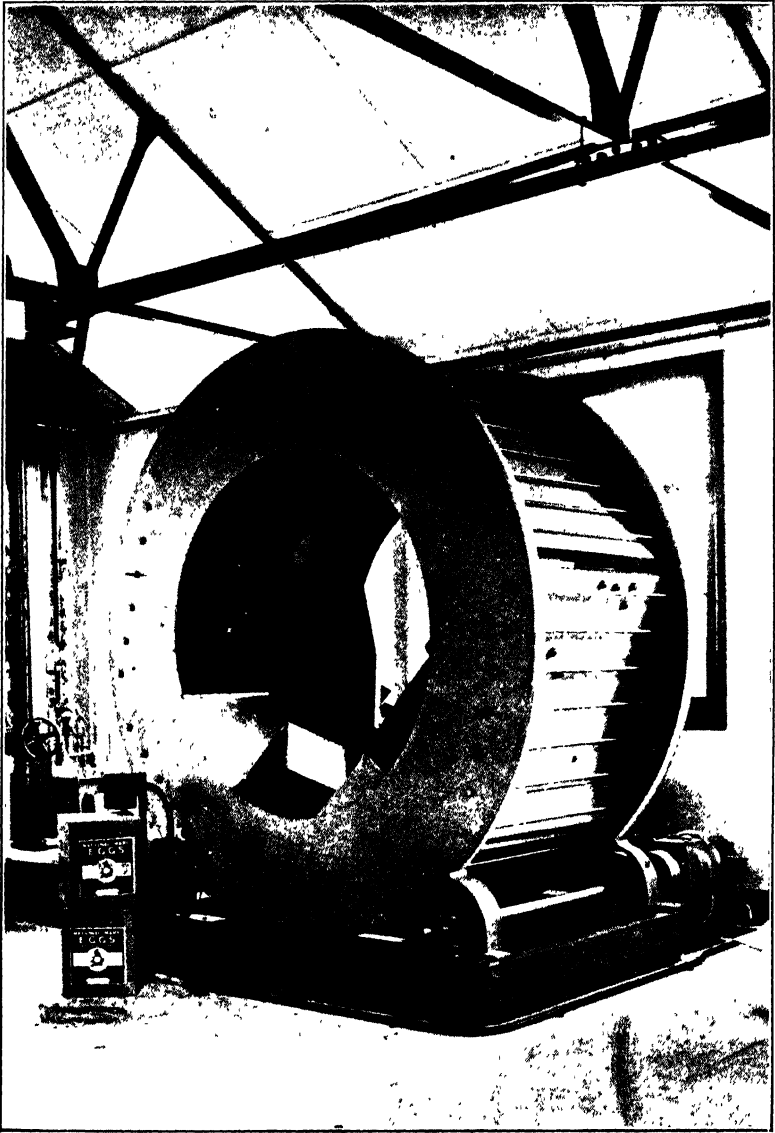
the quantity of home-grown millable wheat ranking for full deficiency payment, farmers do not, in fact, secure a return equivalent to the standard price. The more home-grown wheat sold, the greater is the difference between the farmer's receipts and the standard price laid down in the Act. For example, in the present cereal year it is estimated that the quantity to be sold may reach 35,000,000 cwt. As a result, it is likely that farmers who realize the average market price for their wheat will secure, in the aggregate, not 45s. *od.* per quarter but only 39s. 6*d.* per quarter. By this mechanism, the farmers' receipts from wheat are brought nearer to parity with the receipts from other crops. The Wheat Act itself, therefore, limits the likelihood of over-production or the growing of wheat upon land unsuitable for the purpose. The Committee qualify this by adding that if the growing of sugar-beet became less attractive in any marked degree, it might have an appreciable effect on the wheat acreage.

The Committee state that the period of three years since the passing of the Wheat Act has proved in practice too short to enable definite conclusions to be reached as regards the future, particularly in view of the bountiful harvests of 1933 and 1934, and they therefore suggest that it might be desirable to contemplate a similar inquiry after a further period.

The Report is published by H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 6*d.*, post free 7*d.*

Box-testing Equipment

EQUIPMENT for testing packing cases, wooden boxes and fibre containers of all descriptions, by stresses similar to those experienced in road and rail transport, has been erected by the Department of Scientific and Industrial Research at the Forest Products Research Laboratory, Princes Risborough. The installation is the first of its kind in this country, and its use should enable industrial firms to effect considerable economies in transport costs. In America, there are five such plants available for public use, in addition to several others erected by private firms; and the Committee on Freight Claims Prevention of the American Railway Association states that the improvements in packing instituted as a result of tests by these plants have



The Rotating Drum Tester. Equipment for the endurance test of boxes at the Forest Products Research Laboratory. A 15-doz egg case is in position ready for the test.

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reduced the claims for damage paid by the American Railways from \$120,000,000 in 1920 to \$19,000,000 in 1932.

The up-to-date plant at Princes Risborough provides for endurance and strength tests of the boxes, and of the material employed in their construction. The principal endurance test is furnished by a large rotating drum, 8 ft. in diameter, revolving twice a minute (see accompanying illustration). The box to be tested is placed in the drum, which can take cases of a size up to 2 ft. cube. As the drum revolves, wooden baffles on its inner face catch the box under test, and roll it over, so that it falls on its edges, corners and faces in turn. A moderately well-made wooden container has been found to open up after about 30 falls; but one really well-designed has withstood 150 or more falls. In this manner, the hazards of modern transport are simulated; and a technique has been developed by which the stability of packing cases of new design can be compared with those whose strength has been established under actual use.

The resistance of a case to more drastic treatment is tested by a "dropping" machine, in which the case is made to fall from a height on to a steel plate. This machine is also designed so that the case can be dropped on a face, corner or edge at will.

A third piece of testing equipment is a crushing machine, by which compressive stresses can be applied to the opposite faces or corners of the box: this determines the resistance of the container to crushing when stacked in storage or during transit, and is of particular value for testing fibre-board containers, their rigidity during storage being of special importance. The utility of the machine was shown in some preliminary experiments on the strengthening of a wooden packing case by the addition of wooden battens. One type of case opened up under a pressure of 550 lb. applied at the ends. When, however, battens were put round the ends, it withstood a pressure of 1,000 lb., and with the further addition of battens round the four sides, the case did not give way until a pressure of 2,000 lb. had been reached.

The effect of nailing, and the efficiency of different types of fastenings are also demonstrated by the various tests, as well as the protection for fragile contents afforded by various types of pack.

On behalf of the Ministry, a first special use of the plant is being made for tests to furnish the necessary data to

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draw up a standard specification for fibre-board containers for National Mark Eggs. The degree of protection for the contents provided by various types of container is being demonstrated by tests on the tumbling drum. Preliminary results show that, after 12 falls in the drum, the breakages in a package of average good design, containing 180 eggs, may range from 15 to 20; in a container of poor design, the breakages may rise to over 40; but, with some other types of container, the average of breakages may be as low as 7. There is, thus, plenty of opportunity to reduce wastage by improvements in the design of containers and in their packing. The Ministry has also arranged, for the guidance of the National Mark Fruit Trade Committee, for tests to be made of containers for home-grown tomatoes.

The Box Testing Laboratory will be available to manufacturers and others who wish to study possible improvements in methods of box construction, and in the packing of contents to give the greatest protection. The scale of charges, and a statement of the conditions under which tests will be made, can be obtained from the Director, Forest Products Research Laboratory, Princes Risborough, Bucks.

Agricultural Machinery Testing Committee

THE undermentioned Certificates and Reports, issued by the Ministry, have been published in pamphlet form (price 2d., post free 2½d.):—

No. 54. The Melotte "Twin Breast" "One-way" Plough. Type C.R.T.

No. 55. The Melotte "Twin Breast" "One-way" Tractor Plough. Type M.R.T. 35.

The tests were carried out by the Institute for Research in Agricultural Engineering, University of Oxford, and the Norfolk Agricultural Station, Sprowston, Norwich.

Copies of the pamphlets may be obtained, at the prices stated, through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

FARM WATER SUPPLY EQUIPMENT

C. A. CAMERON BROWN, B.Sc., A.M.I.E.E.,
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WATER supply has provided one of the more serious of the lesser farming problems during the past two years; lesser in the sense, that is to say, that it comes after the more fundamental and serious economic problems of marketing, but important enough in its practical difficulties to the farmer who is faced with a water shortage. The feature of the recent dry cycle was the failure of the winter snow and rains after the first dry summer, and the consequent inability of springs and wells to recuperate sufficiently to meet the demands of a second dry summer. The height of the actual shortage of water was reached during the spring, and not until December was there anything approaching a sufficient rainfall to relieve the necessity for utmost care in using water. It is not expected that, even with a succession of normal seasons, there will be a complete restoration of the *status quo* in wells and springs for two or three years.

The dairy farmer was the most seriously affected by the shortage; not only had the stock to be watered but in many instances milk had to be cooled. Water may be, and had to be, carted and carried in sufficient quantity for drinking purposes; but water available for distribution in this way generally comes from rivers, streams and ponds, and in summer is too warm for cooling milk. In any event, there would be great difficulty in putting it through the standard cooler. Some farmers conserved what little they had by pumping water from the well through the cooler and down into the well again as being the coolest practicable place to store it; other sources were tapped for drinking water, but the cold well water was not allowed to be wasted. This difficulty can be circumvented, of course, by using a cooling plant, and many farmers are at the moment looking ahead and installing such plants.

Failure of the existing water supply and the provision of a new supply are problems that can only be solved by the consulting engineer or the water-diviner, although more often than not success is achieved by the local firm of agricultural engineers with a judicious blend of the

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powers and practices of both these professions. It is the purpose of this article to draw attention to the different ways in which the handling of the water supply may be made independent of hand-pumping, and in particular to the more modern ways of making water available for use with the minimum of labour and inconvenience.

Few farmers in England are in the fortunate position of having a supply of water under pressure from a natural source, either from a reservoir on a hill or from an artesian well, and some form of pumping has to be used. Hand-pumping necessitates using a source of water near the farm, but, when power is available, use may be made of sources of supply not immediately adjoining the buildings and, perhaps because of that, affording a better supply. In this connexion it may be as well to draw attention to the possibility of laying pipes direct in the ground by means of a tractor and mole-draining tool. In this method a mole drain is drawn at the required depth along the line of the pipe-run, lengths of galvanized steel pipe being drawn in by the mole plough as it moves forward. The number of lengths which may be coupled together and drawn in at one operation depends on the soil and on the power available. Clay soil is best and there should be no difficulty in pulling in from 2 to 5 lengths at a time by direct tractor haulage. Holes are dug where each operation is to start and finish, and this enables adjacent sections of pipe to be coupled up after drawing in. By this means the cost of laying water pipes is reduced and there is little damage to the surface, so that one objection to the use of an outlying source of water supply is removed.

Another objection to using an outlying well or spring is the difficulty in providing power and attending to the power unit. Where an engine is used, the provision of power is simple, but its control and supervision may be highly inconvenient. Where electric power is used, the provision of the supply of electricity may be inconvenient and expensive, but control and supervision are simple and may, indeed, be automatic. It is not fully appreciated that for the supply of electricity a heavy pole-line such as is so often used is not at all necessary. Where a pump of one to three horsepower or so is to be supplied over private land, light poles and a light line can be used at a fifth of the cost of the normal supply company's line. Builders' poles, of good quality, can be provided, erected and fitted with stays and

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insulator brackets for as little as 15s. each; this figure may be reduced on a self-supplying estate. The cheapness of a light line offers an inducement to deviate from the shortest route, and advantage can be taken of backgrounds that mask the unsightliness of the line.

The ultimate aim in providing a convenient water supply is to have adequate pressure at the service tap and to have the service automatically available at all times. This is a practical possibility only where electric power is available, since the incorporation of automatic starting devices to engine-driven pumps is not practicable on the small scale of the farm water supply. The engine manufacturers need not grudge this admission, since of the total of some 400,000 farms, less than 7,000 have a main supply of electricity and not many more will have a private plant capable of driving a pump.

Any pumping plant supplying an overhead gravity feed tank can be converted to automatic supply by fitting it with an electric motor at the pump and with a float-switch at the tank. The changing level of the water in the tank raises and lowers a float that is coupled to a switch; when the float position is low the switch is moved to the "on" position, so starting the motor, the high level position moving the switch to the "off" position, when the motor stops. The float-switch can usually be adjusted to work at different water levels. The nervous user, who likes to feel that there is plenty of water in reserve in case of a failure of the pump or of the electric supply, will set the float to work when the water level has fallen only a short way. It is better, however, to allow the level to sink a fair way down the tank, down to, say, one-half or one-third full before pumping starts again. This reduces the number of starts and minimizes wear and tear on the starting gear, which is the weak point in the electrical system, besides cutting out some of the heavy starting current.

The weakness of the gravity tank system is that the service pressure is low unless considerable extra trouble is taken to provide a high tank. It is not usual to find a tank at more than 30 ft. above average tap level, and this provides a service pressure, not allowing for pipe losses, of only some 13 lb. per sq. in., whereas 40 lb. per sq. in. is required for really effective watering or washing purposes. This can be obtained automatically without an overhead reservoir by installing an air-pressure controlled set. A

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pump passes water into a cylindrical tank, in which an air-space is left, and gradually compresses the air until a pre-determined pressure is reached, when an air-pressure switch cuts out the motor. On water being drawn from the system, the air pressure falls, and at a certain pre-determined point the pressure switch starts the motor. The pressure differential is usually 15-20 lb. per sq. in., so that a set adjusted to give a maximum pressure of 50 lb. per sq. in. would give a minimum pressure of 30-35 lb. The pressure tank is beside the pump, and the whole system can be installed in a quite unobtrusive manner.

The pressure set provides water at a good pressure and gives the same type of service as would be afforded by a mains water supply; there is no bulk of water stored in an exposed position and liable to freeze in the winter or to warm up in the summer. The drawback is that the pressure tank provides only a small storage in the event of failure of the pump, and it is therefore particularly important to buy a set from a first-class firm and of a type least liable to running troubles. Electric mains failures are not often experienced and rarely last for more than an hour or two. The self-priming centrifugal type of pump is probably preferable for this application, since its higher running cost is offset by its simplicity of construction and freedom from gearing and working parts, which are each a possible source of trouble. A three-phase motor is more reliable and is cheaper than any other, but where single-phase only is available a repulsion start-induction running type of motor, or the automatic split phase, or capacitor types are vastly preferable to a commutator (running) type. An installation of this nature running for the past year and delivering 2,000-3,000 gal. per day at a pressure of 25-45 lb. per sq. in., using electricity at $1\frac{1}{4}$ d. per unit, has cost 0.45s. per 1,000 gal., including overhead costs on the plant. In this particular installation trouble was experienced at first by the cattle being unable to use the drinking bowls under the higher pressure without flooding the stalls. Within a week, however, they had acquired the necessary nicety of touch and were quite at home with the new supply.

These automatic air-pressure sets will often be installed by agricultural engineers unfamiliar with the principle, and a word of warning might be in place. The pressure tank is not usually fitted with any visual indication of the water level in the tank, and it is advisable that the provision of

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this should be specified; a gauge glass fitted with cocks is satisfactory and enables the quantity of air to be kept right by a periodical opening of an air inlet valve on the suction side of the pump. The self-priming centrifugal pump, in particular, is as yet unfamiliar; a foot-valve to the suction line is unnecessary, but a good strainer is highly essential to prevent the strong suction drawing in solid matter. The suction line must be in perfect condition; a small air leak will not prevent water being pumped, but air will be pumped at the same time and upset the balance of air and water in the tank.

Where electricity is not available, there is, of course, no alternative to the engine-driven set, which does not lend itself to any other than the simple gravity tank arrangement, with periodical refilling. Automatic starting of such a set would not be very practicable in a small plant, but it might be possible to arrange a battery-driven relay which, when actuated by a float will cut out the ignition of the engine when the tank is full. This would remove a certain proportion of the inconvenience of an engine set, unless, of course, it is a heavy-oil engine having no magneto, when automatic stopping will still be possible but will not be so easily arranged.

There are now many alternatives to the belt-cum-gear driven pump, which at one time was the favourite plant for farm and estate supply, and which was noisy and oily, as well as inconsiderate in the amount of room it required. For domestic and small farm supplies there is an excellent range of unit-construction, high-speed reciprocating pumps. These are usually built with the engine, motor, the pump and the intermediate V-belt or gear reduction mounted in one unit. They are expressly made for light duty work, and within that limit, with a daily delivery of up to say 500 gal., they are excellent. They only require some $\frac{1}{4}$ -h.p. to drive them and are very economical to run; the usual order of performance is a delivery of 250 gal. per hour at a total lift of 80 ft., including 26 ft. of suction lift. For more arduous work—and many farms require 1,000-2,000 gal. per day—it is better to instal a high-duty piston pump of more robust build, and capable of giving higher delivery rates and head. Double-acting gear-driven pumps of this type, driven by a $1\frac{1}{2}$ -h.p. engine, deliver up to 1,500 gal. per hour, and will lift up to 200 ft. They may be either engine or motor driven.

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Centrifugal pumps are preferable where a large quantity of water is to be handled with a low lift, and particularly with a low suction lift. One of the most useful applications of this type of pump is for ditch and pond emptying, where, with the few feet of lift that is necessary, a 78 c.c. engine will deliver some 2,000-3,000 gal. per hour. One pumping set of this type is mounted on a chassis with pneumatic tyres and makes an excellent machine for general estate work. The self-priming centrifugal pump is a later development which, by virtue of a different form of the inside vanes and guides, affords the simplicity of the centrifugal while providing a better lift. A good pump of this type will suck from 27 ft., and will provide delivery pressures up to 70 lb. per sq. in. (160 ft.). Owing to its performance characteristic, which it shares with the simple centrifugal, the delivery side can be closed altogether without overloading the driving unit. This makes it foolproof, and it can be used for direct high-pressure hosing, where the valve is open and shut as the work proceeds. Both the centrifugal pumps are less efficient in these small sizes than are the piston pumps, but are generally lower in first cost.

The pumps so far mentioned can be used where the pump is mounted within a short distance of the water surface, from 10 to 25 ft. according to the suction properties of the type of pump. When the well is deeper than 25 ft. or so, a departure from the simplest devices is required. A deep well can always be handled by a shallow-well pump, which would be mounted complete with power unit on a bracket inside the well and within the required distance of the water. This is not satisfactory with any type of power unit, and least of all with the electric motor, which is vulnerable to damp. The inconvenience of having to descend to start and stop the pump would put an engine-driven pump too out of the question. The alternative is to have the pump in the well and the driving unit at the top, and this is done in the example of the popular and effective cylinder-and-bucket deep-well pumping plant. The principle is old, of course, but the modern development of the idea in the direction of lightening and improving the working parts has been highly successful. Not only has the pump been improved, but the power head, which may be engine- or motor-driven, has developed into an enclosed gear unit running in an oil bath. Where electricity is available, this type of pump can be used on the automatic air-pressure system.

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There is available a small pump running on the injector principle, which has two pipes in the well, a power pipe and a delivery pipe, part of the water received by the pump at the top of the well being by-passed under pressure down the power pipe and so operating the injector device. This pump is low in first cost, but is expensive to run: it may be useful in certain circumstances where it is impossible to obtain the vertical drop necessary for the cylinder-and-bucket type. There is also a new submersible motor-driven pump available, in small sizes for bore-holes of 6 in. and upwards. The complete unit, motor and submersible pump, is immersed in the water, the motor being specially wound and protected for the purpose. This affords a neat, effective and efficient outfit.

Windmills are an effective method of maintaining the water supply, but the absence of running costs for power is largely nullified by the higher first cost as compared with the engine- and motor-driven sets: higher storage capacity is required to cope with calm periods. An 8 ft. mill might be expected to raise 200 gal. per hour to a height of 50 ft. in a wind of some 15 m.p.h.

Most farmers are aware of the possibilities of the ram for raising water and maintaining a steady supply, a method that necessitates the provision of little in the way of storage. Not so many appreciate that there is a type of ram that can be operated from a supply of impure water and yet raise pure water from an adjoining source. These double rams will lift the pure water from a depth of as much as 10 ft. and pump it to as much as 1,000 ft. above the ram.

The whole trend of recent development in pumping plants has been to afford small sets that are of particular appeal to those whose requirements hardly justified them buying one of the larger sets. For £25, an engine-driven pump, or, for as little as £12, one of the electrically-driven type, will satisfy ordinary needs. The farmer who requires a high-duty pump can have one complete with engine for a little over £30, or with motor for £20. An automatic air-pressure operated set capable of delivering 3,000 gal. per day with ease need not cost more than £30 complete. One might feel more certain with a mains water supply, but the cost of the water delivered from the private plant will be lower, and by good planning the private supply need not be less reliable.

AN ANALYSIS OF SOME EGG FAULTS—II*

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Relation of Faults with Productivity.—It would be natural to assume that the eggs from hens producing a comparatively small number of eggs during their laying season would tend to be of better quality than those from high-producing hens. In order to test this point, the birds were sorted into groups according to their production records, and the average percentage of faults in each group ascertained. If the assumption made above were true, the percentage of faults would be expected to increase as the annual egg production figures increased. The results obtained are shown in Table VII.

TABLE VII. NUMBER OF EGGS LAID DURING SEASON.

	30 — 70		71 — 110		111 — 150		151 — 190		191 — 230		231 & above	
	No. of birds	Percentage Faults	No. of birds	Percentage Faults	No. of birds	Percentage Faults	No. of birds	Percentage Faults	No. of birds	Percentage Faults	No. of birds	Percentage Faults
Season												
1931-32	21	5.1±0.94	35	2.9±0.29	117	1.8±0.15	143	1.4±0.10	20	1.5±0.20	—	—
1932-33	27	5.0±0.79	36	4.3±0.63	111	4.8±0.24	132	2.8±0.13	13	1.8±0.31	—	—
1933-34	21	2.7±0.47	21	4.3±0.47	44	4.1±0.59	95	3.0±0.17	103	3.2±0.17	60	2.8±0.14

It will be noted that the percentage of faults, instead of increasing as the annual egg productions increase, tends to decrease. It will, however, be apparent from the probable errors of the averages of the samples used for this investigation that the numbers of birds taken in each group are generally too small to represent a fair sample, or to allow any significance to be attached to these group differences. It is, nevertheless, clear that there is no positive evidence of an increase in production of faulty eggs as the egg production of the individual increases; that is, high-producing hens showed no greater tendency to produce faulty eggs than low-producing hens. It may, therefore, be accepted that the assumption that the high-producing hen produces a relatively larger number of faulty eggs than a low-producing hen is not substantiated.

* The first part of this article appeared in last month's (June) issue of this JOURNAL, pp. 236-245.

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Relation of Faults with Feeding and Management.—

The system of feeding, housing and management of the birds, from which the data were obtained, was the same throughout the period under observation. It is, therefore, impossible to make any pronouncement concerning the relation of the incidence of faults with different systems of housing and management. The nature of the distribution of the faults among the individual hens does, however, indicate that the occurrence of faults is an individual characteristic rather than a reflex of the system of feeding or management adopted. It has been widely held among poultry keepers that meat spots and blood spots are caused through high-protein feeding, and it so happens that the county egg-laying trial birds received a mash containing $12\frac{1}{2}$ per cent. of fish meal, i.e., a mash that is considered by some to be a "forcing mash." It further happens that "meat spots" among these birds was a fault of major occurrence, and it would, therefore, appear, at first sight, that the prevalent view that forcing mashes induce the appearance of meat spots has some foundation. In 1931-32, 94 faults were due to this cause; in 1932-33, 276; and, in 1933-34, 510. It will, therefore, be noticed that the faults due to this cause increased during the three seasons, although the feeding and management were the same. If the individuals are grouped according to the frequency with which this fault occurred the figures in Table VIII are obtained.

TABLE VIII. MEAT SPOTS.

<i>No. of eggs with meat spots, aid by the bird.</i>	<i>No. of individuals.</i>		
	1931-32.	1932-33.	1933-34.
0 ..	292	196	157
1 ..	35	89	86
2 ..	7	29	51
3 ..	6	15	27
4 ..	—	6	15
5 ..	2	2	7
6 ..	1	3	7
7 ..	1	3	1
8 ..	—	—	3
9 ..	—	—	2
13 ..	—	—	1
22 ..	—	—	1

It will be noted that the number of individuals laying eggs with no faults due to meat spots, preponderated during 1931-32, thus indicating that the faults due to this cause were not due to the diet used. It will further be noted that, as this proportion fell during 1932-33 and 1933-34, the

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individuals laying a relatively large number of meat-spot eggs increased, thus corroborating the opinion that the tendency to lay meat-spot eggs is inherent in the individual and not primarily due to the diet used.

The same picture is presented when the individuals laying deformed shell eggs are similarly treated. The data so obtained is given in Table IX:—

TABLE IX. DEFORMED SHELL.

<i>No. of eggs with deformed shell laid by bird.</i>		<i>No. of individuals.</i>	
		1931-32.	1932-33.
0	..	296	248
1	..	38	60
2	..	5	18
3	..	1	5
4	..	1	6
5	..	—	2
6	..	2	—
7	..	—	1
8	..	1	—
9	..	—	—
10	..	—	—
11	..	—	—
12	..	—	1
17	..	—	1
36	..	—	1

It will be noted that a large number of individuals went through the season without laying a deformed shell egg, thus indicating that the dietary regime adopted was adequate for the production of normally-shelled eggs. The nature of the occurrence of this fault again points to the probability that the tendency to produce faulty eggs of this description is inherent in the individual bird itself.

TABLE X. WATERY WHITE.

<i>No. of eggs with watery white. laid by bird</i>		<i>No. of individuals.</i>	
		1931-32.	1932-33.
0	..	219	213
1	..	77	68
2	..	29	36
3	..	10	11
4	..	2	8
5	..	1	3
6	..	2	—
7	..	—	1
8	..	1	—
9	..	1	1
10	..	—	—
11	..	1	—
12	..	—	—
23	..	1	—
30	..	—	1
39	..	—	1

As regards watery white (Table X), a deterioration was shown in 1932-33, followed by a recovery in 1933-34. The

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nature of the occurrence of this fault again pointed to the individual being at fault rather than the dietary regime.

TABLE XI. LARGE AIRSPACE.

The data with regard to large airspace was as follows:—

<i>No. of eggs with large airspace.</i>		<i>No. of individuals.</i>			
<i>laid by bird</i>					
	1931-32.		1932-33.		1933-34.
0	304	..	183	..	201
1	28	..	83	..	91
2	8	..	32	..	32
3	3	..	14	..	13
4	1	..	12	..	6
5	—	..	7	..	5
6	—	..	—	..	3
7	—	..	3	..	2
8	—	..	3	..	1
9	—	..	—	..	1
10	—	..	1	..	—
11	—	..	1	..	2
12	—	..	1	..	—
13	—	..	1	..	—
14	—	..	1	..	—
18	—	..	1	..	—
39	—	..	—	..	1

Consideration of the data concerned shows that there was a remarkable increase of large airspace faults (Table XI) during 1933 and 1934. The distribution of the faults again indicates that the fault is associated with the individual, but, at the same time, it is impossible to ignore the fact that season may play an important role in its incidence. High temperature combined with low humidity are the predetermining factors in the loss of moisture through the shell, and it is noteworthy that, during 1933 and 1934, the rainfall was considerably less than the average. It is, therefore, conceivable that the large increase in faulty eggs due to large airspace during 1933 and 1934 was due to the abnormal weather conditions.

TABLE XII. DROPPED YOLKS.

The data with regard to dropped yolks was as follows:—

<i>No. of eggs with dropped yolks.</i>		<i>No. of individuals.</i>			
<i>laid by bird</i>					
	1931-32.		1932-33.		1933-34.
0	287	..	188	..	232
1	46	..	90	..	90
2	6	..	33	..	21
3	4	..	13	..	9
4	—	..	10	..	4
5	1	..	6	..	2
6	—	..	1	..	—
7	—	..	1	..	—
16	—	..	1	..	—

It will be noted that the individuals laying faulty dropped yolk eggs (Table XII) showed a marked increase during 1933 and 1934, the increase during 1933 being greater than

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that during 1934. It is, again, conceivable that climatic conditions may possibly have some effect in influencing the appearance of this fault, but the evidence is not so definite as it is in the case of the large airspace fault.

Note.—With regard to Tables VIII to XII, owing to the fact that faults in non-trapped eggs are not included, the totals given in these Tables do not agree with the grand totals of eggs given in an earlier Table.

Relation of Occurrence of Faults with the Individual.

—The analysis of the occurrence of faults has indicated that the faults are associated with the individual bird as a general rule rather than with the conditions of diet and management or season. If this were the case, one would expect to find that certain individuals exhibit a tendency to produce faulty eggs of a particular type, that is, a large percentage of the faulty eggs laid by that individual would be of a particular kind. Examination of the individual records has revealed the fact that such individuals do exist. In obtaining the figures given below (Table XIII), birds credited with one fault only were ignored. The one fact of importance that emerges from these data is that 224 individuals out of 729 laying more than one faulty egg

TABLE XIII. RELATION OF OCCURRENCE OF FAULTS
WITH THE INDIVIDUAL HEN.

Meat spots.—Fifty individuals laid more than 50 per cent. of the total faults as meat spots, and were grouped as follows:—

<i>No. of individuals.</i>	<i>Total faults.</i>	<i>Meat spots.</i>	<i>Percentage of total faults.</i>
6 ..	2 ..	2 ..	100
8 ..	3 ..	2 ..	67
4 ..	3 ..	3 ..	100
5 ..	4 ..	3 ..	75
2 ..	5 ..	3 ..	60
2 ..	5 ..	4 ..	80
6 ..	6 ..	4 ..	67
1 ..	6 ..	5 ..	83
2 ..	7 ..	4 ..	57
1 ..	7 ..	6 ..	86
1 ..	8 ..	5 ..	62
1 ..	8 ..	7 ..	89
3 ..	9 ..	5 ..	56
1 ..	9 ..	6 ..	67
1 ..	9 ..	8 ..	89
1 ..	10 ..	8 ..	80
1 ..	11 ..	7 ..	64
1 ..	13 ..	7 ..	54
1 ..	14 ..	9 ..	64
1 ..	23 ..	12 ..	52
1 ..	34 ..	22 ..	65

Weighted average = 69 per cent.

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produced 50 per cent. or more of faulty eggs of a particular type. If the faults were produced on a randomized basis, the number of individuals producing more than 50 per cent. of faults of a particular type would be extremely small. The conclusion that the tendency to produce egg faults of a particular type is an inherent characteristic of the individual hen can therefore be accepted as substantiated.

TABLE XIII. (Continued.)

Dropped yolks.—Twenty-four individuals laid more than 50 per cent. of the total faults as dropped yolks, and were grouped as follows:—

<i>No. of individuals.</i>		<i>Total faults.</i>		<i>Dropped yolks.</i>		<i>Percentage of total faults.</i>
6	..	2	..	2	..	100
2	..	3	..	2	..	67
2	..	3	..	3	..	100
1	..	4	..	3	..	75
1	..	5	..	3	..	60
2	..	5	..	4	..	80
1	..	5	..	5	..	100
1	..	6	..	4	..	67
2	..	7	..	4	..	57
2	..	7	..	5	..	72
1	..	8	..	5	..	62
1	..	8	..	8	..	100
1	..	9	..	6	..	67
1	..	27	..	16	..	59

Weighted average = 66 per cent.

Deformed shell.—Twenty-two individuals laid more than 50 per cent. of the total faults as deformed shells, and were grouped as follows:—

<i>No. of individuals.</i>		<i>Total faults.</i>		<i>Deformed shells.</i>		<i>Percentage of total faults.</i>
3	..	2	..	2	..	100
3	..	3	..	2	..	67
1	..	4	..	3	..	75
3	..	6	..	4	..	67
2	..	7	..	5	..	72
1	..	7	..	6	..	86
1	..	8	..	6	..	75
1	..	8	..	7	..	87
1	..	9	..	6	..	67
1	..	10	..	7	..	70
1	..	12	..	7	..	58
1	..	20	..	12	..	60
1	..	23	..	15	..	65
1	..	25	..	13	..	52
1	..	67	..	37	..	55

Weighted average = 64 per cent.

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TABLE XIII. (Continued.)

Large airspace.—Forty-two individuals laid more than 50 per cent. of the total faults as large airspace, and were grouped as follows:—

<i>No. of individuals.</i>	<i>Total faults.</i>	<i>Large airspace.</i>	<i>Percentage of total faults.</i>
2	2	2	100
5	3	2	67
1	3	3	100
3	4	3	75
1	4	4	100
1	5	3	60
1	5	4	80
1	5	5	100
1	6	4	67
3	6	5	83
5	7	4	57
1	8	6	75
1	8	8	100
2	9	5	56
1	9	6	67
1	10	6	60
2	10	7	70
1	11	8	73
1	12	7	58
1	13	10	77
1	14	8	57
1	16	9	56
1	17	13	77
1	19	14	74
1	20	12	60
1	25	18	72
1	46	39	85

Weighted average = 71 per cent.

Blood eggs and Blood spots.—Thirty-three individuals laid more than 50 per cent. of the total faults as blood eggs or blood spots, and were grouped as follows:—

<i>No. of individuals.</i>	<i>Total faults.</i>	<i>Blood eggs or blood-spots.</i>	<i>Percentage of total faults.</i>
5	2	2	100
3	3	2	67
4	3	3	100
2	4	3	75
3	4	4	100
3	5	3	60
1	5	4	80
3	6	5	83
2	8	5	62
1	8	6	75
2	9	5	56
1	10	6	60
1	11	8	73
1	11	10	91
1	21	15	71

Weighted average = 76 per cent.

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TABLE XIII. (Continued.)

Watery white.—Fifty-three individuals laid more than 50 per cent. of the total faults as watery whites, and were grouped as follows:—

<i>No. of individuals.</i>	<i>Total faults.</i>	<i>Watery whites.</i>	<i>Percentage of total faults.</i>
10 ..	2 ..	2 ..	100
15 ..	3 ..	2 ..	67
3 ..	3 ..	3 ..	100
3 ..	4 ..	3 ..	75
3 ..	4 ..	4 ..	100
2 ..	5 ..	3 ..	60
2 ..	5 ..	4 ..	80
1 ..	5 ..	5 ..	100
1 ..	6 ..	4 ..	67
1 ..	6 ..	5 ..	83
1 ..	6 ..	6 ..	100
1 ..	7 ..	5 ..	71
1 ..	7 ..	6 ..	86
1 ..	8 ..	8 ..	100
1 ..	9 ..	7 ..	78
1 ..	9 ..	9 ..	100
1 ..	11 ..	9 ..	82
1 ..	12 ..	7 ..	58
1 ..	14 ..	11 ..	79
1 ..	27 ..	23 ..	85
1 ..	32 ..	30 ..	94
1 ..	67 ..	59 ..	88

Weighted average = 84 per cent.

Relation of Occurrence of Faults with the Individual Breeder.—Since the analysis of faults has given strong presumptive evidence that the occurrence of a particular fault is associated with the individual bird, it would be expected that birds originating from the same breeder would tend to exhibit the same type of fault. Owing to the fact, however, that breeders tend to purchase cockerels from outside sources in order to improve their strains this tendency of the fault to segregate among individuals of the same strain would be to a certain extent masked. However, the data were analysed with regard to this particular point, and some evidence was obtained in favour of the assumption that the tendency to produce a fault of a particular type is inherited. The evidence is presented in Table XIV (pages 334, 335).

It will be noted that, in 31 cases out of 179, evidence was obtained indicating that the faults mentioned were inherited, since the faults tended to occur in most of the six birds entered by each breeder. As regards the watery-white condition, it is noteworthy that only one case occurred in which all the birds giving faults entered by a breeder showed this condition. The analysis of the individual records showed that this condition, when it arises, is serious as far as the individual is concerned,

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TABLE XIV. RELATION OF OCCURRENCE OF FAULTS WITH THE INDIVIDUAL BREEDER.

<i>Meat Spots</i>		<i>Breeder 1</i>		<i>Breeder 2</i>		<i>Breeder 3</i>		<i>Breeder 4</i>		<i>Breeder 5</i>		<i>Breeder 6</i>		<i>Breeder 7</i>	
		<i>M.S.</i>	<i>T.F.</i>	<i>M.S.</i>	<i>T.F.</i>	<i>M.S.</i>	<i>T.F.</i>	<i>M.S.</i>	<i>T.F.</i>	<i>M.S.</i>	<i>T.F.</i>	<i>M.S.</i>	<i>T.F.</i>	<i>M.S.</i>	<i>T.F.</i>
Pullet	1	0	3	11	23	4	8	0	3	2	6	4	10	0	0
	2	2	6	8	9	6	15	4	6	1	8	1	3	5	11
	3	3	7	0	1	3	7	5	9	9	14	0	2	0	5
	4	0	3	4	12	1	3	5	9	0	1	3	9	3	4
	5	3	5	5	12	0	0	22	34	1	1	2	2	1	1
	6	8	19	3	6	2	8	—	—	2	6	2	3	1	3
<i>Deformed Shell</i>		<i>Breeder 8</i>		<i>Breeder 9</i>		<i>Breeder 10</i>		<i>Breeder 11</i>		<i>Breeder 12</i>		<i>Breeder 13</i>			
		<i>D.S.</i>	<i>T.F.</i>	<i>D.S.</i>	<i>T.F.</i>	<i>D.S.</i>	<i>T.F.</i>	<i>D.S.</i>	<i>T.F.</i>	<i>D.S.</i>	<i>T.F.</i>	<i>D.S.</i>	<i>T.F.</i>		
Pullet	1	0	10	1	1	2	12	11	24	0	2	1	27		
	2	1	5	1	2	3	4	1	4	0	2	6	7		
	3	5	9	0	1	3	12	6	16	2	3	0	2		
	4	3	16	6	7	4	9	4	16	2	8	1	3		
	5	6	12	0	1	5	7	0	8	2	3	8	8		
	6	0	0	0	1	0	2	—	—	6	8	—	—		

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Dropped Yolk

	Breeder 14		Breeder 15		Breeder 16		Breeder 17	
	L.A.S.	T.F.	D.Y.	T.F.	D.Y.	T.F.	D.Y.	T.F.
Pullet 1	5	7	1	3	16	27	4	8
2	4	5	3	8	2	3	1	1
3	0	4	2	7	0	0	0	2
4	1	5	1	8	1	2	1	8
5	0	2	5	7	2	4	1	3
6	1	3	0	1	0	4	—	—

Large Airspace

	Breeder 18		Breeder 19		Breeder 20		Breeder 21		Breeder 22		Breeder 23		Breeder 24		Breeder 25	
	L.A.S.	T.F.	L.A.S.	T.F.	L.A.S.	T.F.	L.A.S.	T.F.	L.A.S.	T.F.	L.A.S.	T.F.	L.A.S.	T.F.	L.A.S.	T.F.
Pullet 1	1	7	7	11	1	6	1	1	2	5	5	9	0	1	0	3
2	2	8	1	6	4	17	1	4	3	5	0	3	18	25	1	2
3	2	6	1	3	1	3	1	3	4	17	11	22	3	5	1	3
4	0	3	0	4	4	10	2	6	0	1	3	9	1	6	14	19
5	6	10	2	5	1	4	10	13	4	9	4	14	1	67	7	10
6	0	2	4	11	2	8	2	10	8	14	7	10	0	1	0	1

Blood Egg and Blood Spots

	Breeder 26		Breeder 27		Breeder 28		Breeder 29		Breeder 30		Breeder 31	
	B.S.	T.F.	B.S.	T.F.	B.S.	T.F.	B.S.	T.F.	B.S.	T.F.	W. W.	T.F.
Pullet 1	1	1	1	1	2	4	2	2	4	9	2	6
2	0	0	0	4	15	21	6	7	1	4	4	5
3	0	9	5	6	4	4	4	4	3	4	0	0
4	10	11	4	5	1	6	1	1	3	3	1	3
5	0	3	3	3	2	7	—	—	5	6	0	0
6	3	9	5	6	4	12	—	—	—	—	3	8

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since the percentage occurrence in the total faults is very high (84 per cent. on 53 individuals). The nature of the occurrence of this fault indicates that, if it is hereditary in character, it is recessive in type.

Association of Faults.—It was noted, in going through the individual records, that the faults—meat spots, blood spots and blood eggs—often occurred in the same hen. The data were therefore analysed with regard to this, and it was ascertained that these faults appeared to be associated. 217 individuals laid meat-spot eggs, 95 blood spots and 30 blood eggs. 75 individuals gave meat spots and blood spots in association, 43 blood spots and blood eggs, and 18 meat spots and blood eggs. Meat spots were the most commonly occurring type, then followed blood spots and blood eggs. Since only 30 cases of blood eggs occurring alone were noted in comparison with 43 occurring in association with blood spots it would appear that these two conditions are intimately linked. The linkage of meat spots with blood spots or blood eggs is not so intimate, but the fact that 93 individuals showing linkage of meat spots with either blood spots or blood eggs indicates that there is an association of these faults.

Similarly, the condition recognized as large airspace was frequently associated in the individual with weak shells or deformed shells. Thus, considering in association these three faults, only 180 individuals produced the large airspace condition alone, 48 in conjunction with weak shells, and 146 in conjunction with deformed shells. Whereas 180 individuals produced the large airspace condition as a separate fault, no less than 194 individuals produced the large airspace condition in conjunction with either weak shell or deformed shell. There is, consequently, little doubt that weak and deformed shells are predisposing causes for the occurrence of the condition known as large airspace.

Summary.—

- (1) An analysis of egg faults occurring in 164,831 eggs laid at the West Suffolk egg-laying trials during 1931-34, and candled within approximately one week from laying, showed that the egg faults of most frequent occurrence are meat spots, large airspace, watery whites, deformed shell and dropped yolks.
- (2) The percentage of total faults over the period 1933-34

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worked out at 3.21 per cent., as compared with 6.17 per cent. from eggs received from the general poultry keepers of the county. The general impression that birds received at county egg-laying trials are more prone to produce faulty eggs than others is thus shown to be false. The larger percentage of faults from eggs received from the general farms is shown to be probably associated with hold-up by producers during periods of rising egg prices.

- (3) It is pointed out that the designation of faults varies with different candlers; there is consequently a need for standardization in this respect.
- (4) Evidence is given to prove that it is unsound to regard eggs characterized by rapid rotating yolk movement as faulty, such eggs in fact being often of better quality than those with normal yolk movement.
- (5) Faults in eggs tend to increase during the summer months; the cause for this increase is not yet satisfactorily established.
- (6) There is no correlation between the productivity of the bird and egg faults, since birds with high egg production are as free from faults as those with low egg production.
- (7) Conditions of feeding and management appear to be a secondary, rather than a primary, cause in the production of the egg faults studied.
- (8) The occurrence of a particular type of fault appears to be definitely linked with the individual bird rather than with external conditions, and has been shown to be associated more with certain strains than others.
- (9) Blood eggs, blood spots and meat spots appear to be associated faults, as do large airspace, weak shells and deformed shells.
- (10) It follows, from the findings of paragraph 8, that the quickest method for eliminating faults is the intelligent use of the candling lamp by breeders, followed by rejection as breeding stock of all birds proved to lay faulty eggs.

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VIRUS DISEASES OF CUCUMBER

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MOSAIC disease of cucumbers was first observed in England about fourteen years ago, when two distinct types were recognized. A third type has been described more recently. These three diseases, collectively known as "cucumber Mosaic," are widespread, and cause varying amount of loss each year, though up to the present none of them has reached epidemic proportions in the country as a whole. In addition to differing in symptoms, the three types of cucumber Mosaic differ in the amount of loss they are liable to cause. It is important for a grower to be able to recognize an outbreak of Mosaic at once, especially one of the more serious type, so that suitable steps to combat the disease may be taken at the outset. In this article the three types of cucumber Mosaic are described and a general discussion of the problem and of control measures is then presented.

1. Green-mottle Mosaic (caused by cucumber virus 3).—This disease, though the commonest of the three, is fortunately the one likely to do the least damage. The characteristic symptoms are a mottling, restricted to shades of light and dark green, together with puckering and distortion of the leaves, and some stunting of the plant (see Fig. 1.) Usually all the leaves developed after infection has occurred show symptoms of the disease; those fully developed at the time of infection show no symptoms, though the virus may penetrate to all parts of the plant. This is also true for the two other types and for Mosaic diseases generally. The intensity of both the mottling and distortion varies somewhat with the season, the former being less evident, but distortion more so, in winter than in summer. Mottled leaves sometimes show a few scattered yellow flecks which may be quite conspicuous; but a general yellow mottling of the leaves, a characteristic symptom of the two following diseases, does not occur. The fruit is not usually affected though at times it is mildly mottled.



FIG. 1 Cucumber plant affected by Green-mottle Mosaic

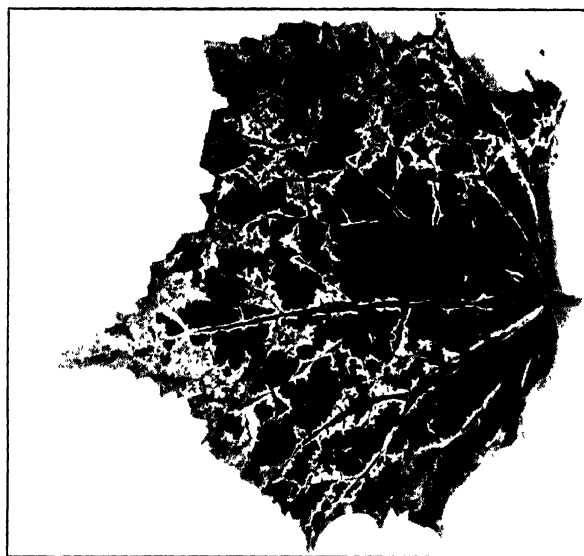


FIG. 2 (above) Leaf from Cucumber plant affected with Yellow Mosaic

FIG. 3 (left) Cucumber fruit affected by Yellow Mosaic

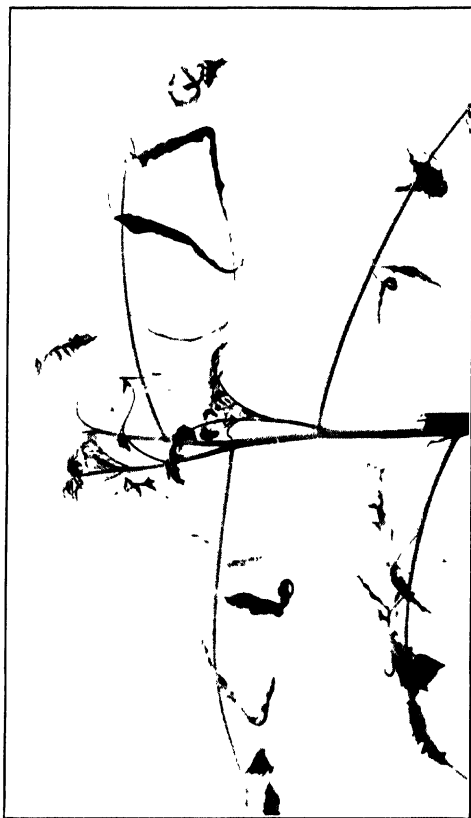
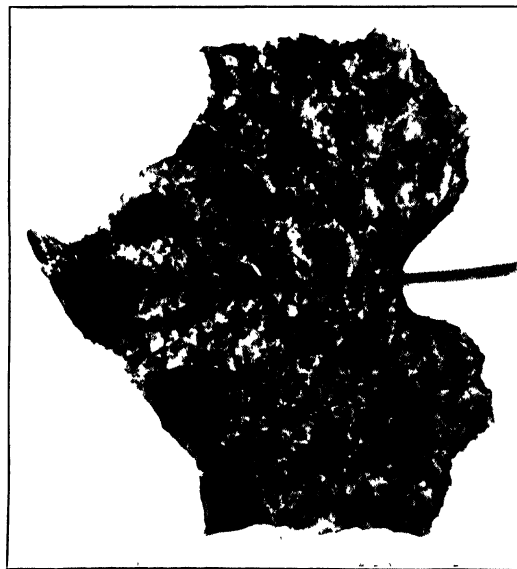
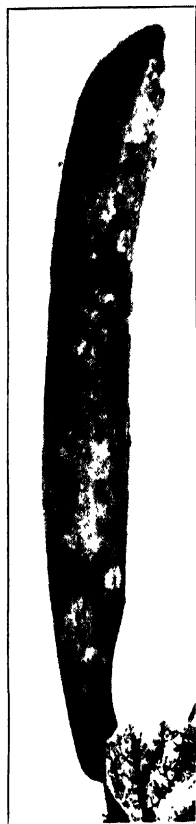


FIG. 4 (top-left). Cucumber leaf showing symptoms of Yellow-mottle Mosaic.

FIG. 5 (left). Cucumber fruit affected by Yellow-mottle Mosaic.

FIG. 6 (above). Tomato plant showing true "fern leaf" symptoms (due to Yellow-mottle Mosaic (cucumber virus 1)).



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2. Yellow Mosaic (caused by **cucumber virus 4**).—This disease is recognized by the appearance of yellow mosaic-like patterns on the leaves. The mottle or variegation is sharply defined, but there is diversity in the patterns produced. Few to many yellow star-like spots may be exhibited, or the yellowing may tend to follow the veins (*see* Fig. 2), sometimes giving the effect of a filigree of fine yellow lines. The colour of the pattern is typically pale yellow, but it varies to greenish-cream or to nearly white. If growing conditions are not very favourable, this disease may be confused with Green-mottle Mosaic, for the definite yellow colour is replaced by a rather inconspicuous yellowish-green mottle. Yellow Mosaic disfigures the fruit with yellow or silvery spots or streaks (*see* Fig. 3), which render it unmarketable. There is evidence that fruit damage is most severe at temperatures above 84°F.

As far as is known at present the viruses of both Green-mottle Mosaic and Yellow Mosaic will infect plants belonging to the cucumber family only. They cause diseases of melon, gherkin and water-melon, but vegetable marrow appears to be resistant. They cannot infect the tomato. Both these viruses are able to exist for some months in dead cucumber plant tissue.

3. Yellow-mottle Mosaic (caused by **cucumber virus 1**).—Yellow-mottle Mosaic is the most serious of the three Mosaic diseases of cucumber, for besides causing great damage to cucumbers the virus is able to infect many other plants, including the tomato. The diagnostic symptoms on cucumber are a diffuse type of yellow mottle, slight to moderately severe distortion of the leaves (*see* Fig. 4), and stunting of the plant. The mottle is more diffuse than that of typical Yellow Mosaic, for the background of the leaf becomes somewhat yellow. The fruit nearly always shows a yellow mottle (*see* Fig. 5), but may occasionally, in more severe cases, be nearly white in colour with irregular green areas.

The virus responsible for this disease also infects melons, gherkins and other cucurbitaceous plants, though not water-melon. The same, or a very similar virus, causes a Mosaic disease of vegetable marrow.

The virus can be transmitted from cucumber to tomato, and it produces in the latter the condition known as "fern leaf." A tomato plant exhibiting fern leaf has the leaf

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blades deeply cut, or reduced to such an extent that the leaflets are thread-like (*see* Fig. 6). The petals, too, may be filiform and few fruits are set. In winter the virus of ordinary tomato Mosaic is able to cause considerable distortion of the leaves, and this condition is sometimes known as fern leaf; but true fern leaf, due to *cucumber virus 1*, may occur in a tomato plant at all times of the year, even in the height of summer when tomato Mosaic is seen as a leaf mottle with only slight distortion. It is interesting to note that fern leaf of tomato is less prevalent at the present time than it is said to have been in the past when cucumber Mosaic was more prevalent than it is now.

The Causative Agents.—These three diseases, as has already been stated, are caused by viruses, agents of types of diseases that are becoming increasingly familiar to the practical man. Accounts of Spotted Wilt of tomato,* Mosaic of sugar-beet,† and Mosaic and Streak of tomato,‡ all virus diseases, have appeared in this JOURNAL in recent months. It may be recalled that viruses are infective agents of minute size, invisible under the highest powers of the microscope. They cause many serious diseases of both plants and animals and they are able to increase and multiply only in association with a living plant or animal.

The length of the interval between infection with a virus and the appearance of symptoms frequently depends on the growth-rate of the plant. In other words, the faster a plant is growing, the sooner the plant begins to show symptoms. For example, in summer, a cucumber plant may show symptoms of disease less than a week after inoculation with the virus, while in winter, when growth of the plant is slow, symptoms may not be seen for nearly three weeks. On the other hand, a "well grown" plant, i.e., well grown from a horticultural point of view, not too "hard" or too "soft," not "drawn" or "stunted," etc., though it may show symptoms sooner than one less well grown, does not usually suffer so severely from an attack and gives a better yield. Tomato Mosaic, for instance, not generally considered a very serious disease, may be so in certain nurseries where the soil is known to be poor. The constitution of the plants is weakened by poverty of the soil and so the

* JOUR. MIN. AGRIC., XXIX, 1097-1103.

† *Ibid.*, XLI, 269-74.

‡ *Ibid.*, XLI, 743-49.

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effects of the disease are greater. Or again, tomato Mosaic can cripple a seedling plant in winter, while in summer the relative effect is much less serious, though the disease appears more quickly after inoculation.

Transmission of the Diseases.—Many virus diseases are known to be transmitted from plant to plant by the agency of insects, but the problem as to what specific insects are concerned in the natural spread of the three cucumber Mosaics has not yet been fully elucidated. Artificial transmission of virus diseases can sometimes be accomplished only with great difficulty, as, for example, by grafting part of a diseased plant on to a healthy one. In other virus diseases, however, of which the cucumber and tomato Mosaics are typical instances, the virus is very readily transferred by mechanical means, as, for instance, by merely handling a diseased plant and then a healthy one.

Control Measures.—When a plant shows symptoms of attack by a virus, the virus itself is present within the living cells of the plant. No method of destroying the virus without at the same time killing the plant is yet known, hence control measures have to be directed chiefly towards the prevention of infection. It seems obviously useless to apply a spray fluid or a germicidal dust to the plants, or any treatment for the soil, methods that prove so successful against fungus diseases; nevertheless such treatments may have an indirect action in preventing the spread of the disease by exterminating insect carriers of the virus or by encouraging plant growth.

The essential point in the control of the cucumber Mosaics (and this applies to the tomato and other crops) is to start with healthy plants and then to ensure that viruses are not introduced from without, since there is no evidence that a virus ever arises spontaneously within a plant. The requirements are, as will be shown, largely fulfilled when the best nursery practices are employed.

One control measure that is of the very greatest use against some plant virus diseases is the employment of varieties that are immune from, or that show resistance to, the particular virus in question; but so far as the cucumber and tomato virus diseases of this country are concerned this measure at present offers little help. All the commercial

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varieties of tomato, for example, appear equally susceptible to Mosaic. Although in one season in one nursery a particular variety may appear to be more resistant than others the position may be reversed in the following year, and tests carried out at this Station on the resistance to Mosaic of numerous varieties of tomato, all grown under the same conditions, have shown no differences in susceptibility. Almost the same applies to the cucumber and its Mosaic diseases, though, in America, cucumber varieties are known that are resistant to Yellow-mottle Mosaic. As far as we in this country are concerned it would probably be unwise to change to other, possibly less commercially valuable, varieties so long as Mosaic diseases are not allowed to attain large proportions, although a knowledge of what varieties, if any, are resistant to Mosaic would certainly be advantageous.

The first requirement to be fulfilled in the production of a healthy crop is to be sure that no infection is being carried in the seed. Experiments in America and this country have shown Yellow-mottle Mosaic to be seed transmissible, and workers at this Station have brought forward evidence that the other two types of cucumber Mosaic behave in the same way. The recommendation of W. F. Bewley to use none but healthy seed has greatly reduced the incidence of cucumber Mosaic in the Lea Valley in recent years. It is, therefore, most important that the seed sown should have been taken from healthy plants only, because a very few diseased seedlings may be sufficient to start an outbreak of disease which would, if neglected, quickly spread and cause much loss.

Sources of infection outside the crop must be eliminated. At the end of the season the glasshouses should be well cleaned and the remains of the old crop completely destroyed. The latter precaution is particularly necessary if any diseased plants have been present, since infected material left in the houses may be the source from which an outbreak of Mosaic arises the following year. Fumigation and other measures against insects are also of value, and drastic treatment can be undertaken when the house is empty and there are no plants to consider.

Weeds both inside and outside the house constitute another danger, for they may be infected and act as reservoirs for the virus. All weeds should be suspect. As to

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cucumber Mosaics, common White Bryony (*Bryonia dioica*) is a particular danger (the virus of Yellow-mottle Mosaic is known to be capable of infecting this plant); but the host ranges of most plant viruses are not known completely. The virus of Spotted Wilt of Tomato is notorious for the number of different plants it can infect (although cucumber is not one of them), while the virus of tomato Mosaic, which till recently was thought capable of infecting only solanaceous plants, has been shown in America to be able to infect at least 29 varieties of plants belonging to 14 different families. The known host range of other viruses is liable to be extended in the same way, hence nothing short of the eradication of all weeds should be aimed at.

If infection of the crop is noticed early in the season, roguing of the diseased plants is advisable, but this is useless unless the plants on all sides of the diseased plants or block of plants are also removed; for, by the time the disease manifests itself in a plant, the virus will almost certainly already have reached those adjacent to it. Growers are often loth to rogue later in the season when re-planting is impossible; for a certain amount of fruit is usually obtainable from a diseased plant; but if conditions are favouring the disease late roguing is certainly worth while.

It is most important, too, to realize how infectious cucumber Mosaics are by touch, and how readily they are spread from infected to healthy plants by the pruning knife and by the workers during cultural operations that necessitate handling the plants. When Mosaic is noticed in a house or block, the plants in such houses should be pruned and watered last of all, and after handling them both hands and the pruning knife should be well washed with soap and water. On no account should a worker handle healthy plants after diseased or suspicious plants without first taking care to remove any contamination from his hands with plenty of soap and water.

The problem of insect carriers of the cucumber Mosaics is still incompletely solved, though certain greenfly, the melon aphid, for example, are able to transmit Yellow-mottle Mosaic. Routine fumigation to prevent large numbers of insects establishing themselves on the plants should therefore be undertaken. The first plants to show infection in

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a particular outbreak of Mosaic investigated by this Station a few years ago were those that were first attacked by Red Spider mites. Both Mosaic disease and Red Spider attack had occurred in the house in the previous year, and this observation suggested that the hibernating mites had possibly carried the disease over from one season to the next. Red Spider mites are not usually considered capable of transmitting virus diseases, but possibly they do so under conditions involving mass infection.

The virus of the Yellow-mottle Mosaic of cucumber, like that of the long-lived tomato Mosaic, frequently occurs in tobacco plants in fields in America; fortunately, however, this particular cucumber virus is short lived and will not survive in dead plant tissue. Cured tobacco is therefore not a source of cucumber Mosaics as it often is of tomato Mosaic, the virus of which is extremely resistant and may survive in tobacco plant tissue for twenty years or longer.

In conclusion it may be stated again that the use of the best nursery practices and cultural methods to obtain "well grown" plants go a long way towards preventing outbreaks of virus diseases and reducing the losses due to such diseases to small proportions.

ACKNOWLEDGMENT.—The author is indebted to the Editors of *The Annals of Applied Biology* for permission to reproduce Figs. 1 to 5 inclusive of the accompanying illustrations.

THE MANAGEMENT OF GROWING PIGS: OUTDOOR v. INDOOR SYSTEMS

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WIDE differences of opinion are to be found regarding the comparative merits of the outdoor and indoor systems of management for growing pigs. Some rearers claim that pigs run out of doors are more healthy than their indoor mates and that, as the former obtain an appreciable proportion of their food in the form of forage, their meal costs are lower. Others state with equal confidence that pigs kept out of doors "run off their fat" or, in other words, use up a considerable amount of previously digested food to provide the energy expended in an excessive amount of exercise, and that, as a result, they require more food than their indoor mates. Such differences of opinion indicate the absence of definite knowledge, and a study of a large number of farms has shown that much money is being wasted owing to the absence of this essential knowledge. The results given below provide definite data regarding the comparative merits of the two systems, and demonstrate some of the more important advantages and disadvantages of both.

Labour charges and the cost of buildings, fencing and equipment are not referred to because these items vary greatly from farm to farm, and the experience gained under one set of conditions is not applicable to all holdings.

The outdoor pigs were kept on comparatively poor grass-land on a thin calcareous soil which had only been down to grass for six years prior to the commencement of the trials, but during the summer months the herbage contained a comparatively high proportion of clover. There is a certain amount of indirect evidence that good grass land produces herbage with a slightly higher food value to the pig than the herbage available in these experiments.

It is necessary to have pigs in relatively small lots for experimental purposes, and the outdoor batches were kept in comparatively small runs, which were grazed solely by the pigs. This system cannot be regarded as ideal, because

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pigs are bad grazers and it is difficult to keep such runs properly grazed. In addition, the cost of fencing is high, and after the runs have been in use for a year or two they are apt to become badly infested with the eggs of parasitic worms. It is a better practice on most farms to run store pigs in larger lots associated with other stock and with free range over comparatively large enclosures.

In this investigation, which ran from June 15, 1933, to May 5, 1934, 215 pigs were used. The first trial was carried out to ascertain whether the standards of feeding generally accepted for indoor pigs are equally applicable to pigs with an adequate supply of grass at their disposal; the second to obtain information regarding the combined value of the grass eaten and the exercise obtained by the outdoor pigs; and the third series of trials to compare the merits of outdoor and indoor management at different times in the year.

Feeding of Grazing Pigs.—The first trial (1)* was designed to obtain information regarding the feeding of pigs with an adequate supply of grass at their disposal. It was carried out between June 15 and August 31, 1932, with 3 groups, each containing 15 pigs, which were kept in grass runs provided with a portable shelter. The runs were well supplied with grass throughout the trial period. Groups 1 and 2 received the same meal mixture, which consisted of cereal meals and a suitable protein supplement, Group 3 was fed on a mixture of cereal meals alone. The pigs in Group 1 received all the meal they would clear up readily twice a day. The quantity of meal fed to Groups 2 and 3 was restricted to the amounts shown in Table 1, which also shows the rations and meal utilization figures for each group between 46 and 100 lb. live weight, that being the period for which the figures were comparable.

TABLE 1.

RATIONS IN PARTS BY WEIGHT

					Group 1.	Group 2.	Group 3.
Weatings	..	..	..	..	60	60	60
Maize meal	..	..	..	..	20	20	20
Barley meal	..	..	..	..	10	10	20
Fish meal	..	..	..	..	7½	7½	—
Soya bean meal	..	..	..	..	2½	2½	—
Chalk	..	..	..	..	—	—	1½
Salt	..	..	..	..	—	—	½

* For references, see p. 352.

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AVERAGE DAILY QUANTITY (in lb.)	Group 1.	Group 2.	Group 3.
1st month	2.5	2	2
2nd month	3.4	2½	2½
Last 23 days	5.5	3	3

MEAL CONSUMED (in lb.) BETWEEN 46 AND 100 LB. LIVE WEIGHT			
Per 100 lb. live weight gained ..	314	333	365

The pigs had an average live weight of 46 lb. at the commencement of the trial. The average weight of Group 1 was 98 lb. at the end of the second month and 124 lb. at the conclusion of the trial, when that of Group 2 was 103 lb. and of Group 3, 98 lb. Thus it will be seen that by restricting the ration of Group 2 the feeding period was prolonged by approximately three weeks.

The results indicate that with growing pigs having free access to a grass run:—

- (a) It is economical to feed all the meal the animals will clear up readily twice a day, for not only is the amount of meal consumed per unit live weight gained increased by restricting the ration, but labour costs are higher owing to the feeding period being lengthened. The practice of restricting the daily ration would only be justified if some advantage, such as a higher sale price, could be secured by lengthening the period of growth; and
- (b) It is economical to include a suitable protein supplement in the ration during the growing period even if there is a plentiful supply of grass at the disposal of the pigs. The figures indicate that the net food value of the grass eaten by the pigs was comparatively small.

Food Value of Grass to the Growing Pig.—The second trial (2) sought more definite information regarding the food value of grass to the grazing pig. The experiment occupied the period between May 31 and August 25, 1933, and two groups were used, each containing 24 pigs divided into 5 lots in such a way that for each lot in Group 1, there was an exactly similar lot, i.e., comparable lot, in Group 2. The two groups were fed upon the same rations. The lots in Group 1 were confined to sties (Fig. 1), while in Group 2 each lot had a grass run furnished with a portable hut (Fig. 2). The pigs in Group 1 received all the meal they would clear up twice daily, but the feeding of the pigs in Group 2 was regulated in such a way that each lot in this group received exactly the same quantity of food as the comparable lot in Group 1. The differences obtained were thus due to the grass eaten and the exercise obtained by the pigs in Group 2. The weights for the two months during which the trial lasted are summarized in Table 2.

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Fig. 3 shows one of the indoor, and Fig. 4 one of the outdoor lots.

TABLE 2.—AVERAGE WEIGHTS OF GROUPS (in lb.)

	FIRST MONTH		SECOND MONTH	
	<i>Average of 5 lots</i>		<i>Average of 2 lots</i>	
	<i>(24 pigs).</i>		<i>(10 pigs).</i>	
	<i>Group 1.</i>	<i>Group 2.</i>	<i>Group 1.</i>	<i>Group 2.</i>
	<i>Indoors.</i>	<i>Outdoors.</i>	<i>Indoors.</i>	<i>Outdoors.</i>
At start	58.6	61.6	89.0	90.2
At finish	85.2	91.1	116.9	119.9
Gain	26.6	29.5	27.9	29.7
Meal consumed per				
100 lb. l.w. gained	308	284	386	362

There was a plentiful supply of grass in the outdoor runs throughout the experimental period, but the pigs in Group 2 were obviously not receiving sufficient food to satisfy their appetites, the inference being that they ate the maximum amount of grass, although the pigs in Group 1, which were confined to sties, were completely satisfied with the same quantity of food.

The great advantage that accrued from keeping Group 2 out of doors lay in the better health of the pigs, a superiority particularly noticeable in hot weather. All the pigs in Group 2 made excellent growth and no ill health was observed amongst them. Those in Group 1 made excellent growth during the first month, but 9 pigs in this group suffered from digestive troubles during the second month, and 3 lots had to be withdrawn. The sick pigs were transferred to outdoor runs and recovered within 14 days.

The figures indicate that the net food value of the grass to the pigs in Group 2 was comparatively small, the saving in meal amounting to approximately 8 per cent. during the first month, and 6½ per cent. during the second month.

Comparative Merits of Outdoor and Indoor Management at Different Times in the Year.—Between April 19, 1933, and May 5, 1934, a series of trials (3) was carried out to obtain information regarding the comparative merits of outdoor and indoor management for growing pigs at different times in the year, using 122 animals.

The pigs in this trial were from a number of litters weaned in March, July, August, September, October and November. After weaning, the pigs were allowed to run out of doors on grass runs for about a fortnight, after which they were put into the experimental

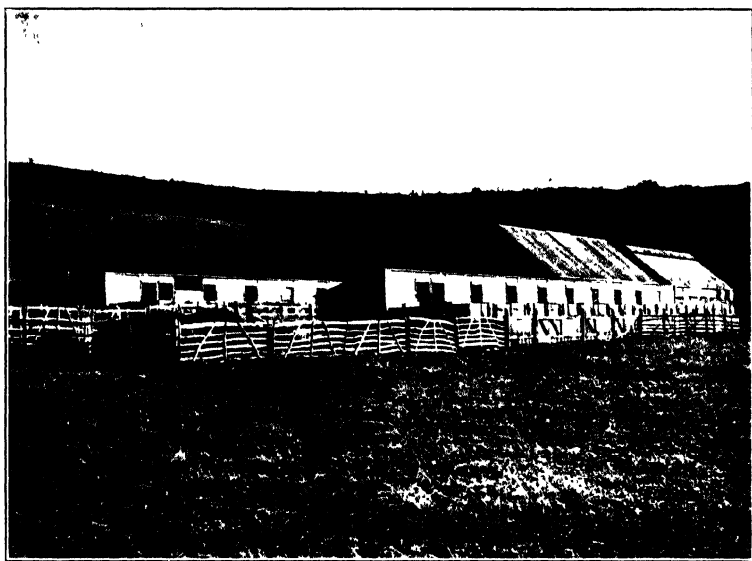


FIG. 1. The buildings used for the indoor pigs. The styes are 8 ft. square, and the runs 8 ft. by 10 ft.



FIG. 2. One of the outdoor pens.

Photos - V. C. Fishwick

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FIG. 3. One of the indoor lots.



Photos : V. C. Fishwick

FIG. 4. An outdoor lot comparable to the indoor lot in Fig. 3.

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Lots. These Lots were formed in pairs, and the two lots in each pair, which will subsequently be referred to as comparable Lots, were as nearly alike in every respect as possible. One Lot from each pair was put into the indoor group, the comparable Lot being put into the outdoor group. Good, indifferent and poor pigs were used, the only animals discarded being those which could not be compared with similar pigs. Lots 1 and 1a each contained 16 pigs; all the other lots contained 5 pigs.

The Lots in the indoor group were confined to sties, those in the outdoor group were kept out of doors in grass runs until they were as near 100 lb. live weight as possible. The pigs received all the food they would clear up twice daily, the comparable Lots receiving the same mixture of meals. The indoor pigs did not receive any green food.

The results are summarized in Table 3. The meal utilization has been worked out on the basis of the increase in carcass weight, the carcass weight at the commencement being taken as two-thirds of the live weight. There is a small error in this estimate, but it affects both lots of the comparable pairs to the same extent.

TABLE 3.

TABLE 3.													
OUTDOOR						INDOOR							
Live weight			Carcass			Live weight			Carcass				
			Meal Com- per par- 100 lb. able						Meal per 100 lb.				
Lot	Starting	Finishing	Weight	gained	Lot	Starting	Finishing	Weight	gained				
	Date	lb.	Date	lb.	lb.	Date	lb.	Date	lb.	lb.			
8	16/8	28.7	9/12	145.0	106.2	480	8a	16/8	28.5	30/12	133.6	97.2	527
9	16/8	28.1	9/12	145.2	105.2	482	9a	16/8	28.1	30/12	130.9	100.4	518
11	6/9	34.2	15/12	134.2	96.8	510	11a	6/9	34.5	28/12	129.7	89.8	538
17	8/11	37.3	17/2	130.2	93	513	17a	8/11	37.3	17/2	129.3	92.4	510
18	15/11	38.7	5/3	145.1	105.4	537	18a	15/11	39.6	5/3	146.4	105.4	523
19	22/11	30.8	5/3(2)	146.1	106.4	561	19a	22/11	30.8	31/3(2)	—	116.0	615
			24/3(3)							5/5(3)			

The outstanding feature of this trial was the superior health of the outdoor pigs, only 2 cases of ill-health being observed amongst the 61 pigs in this group, whilst 11 were recorded amongst the 61 indoor pigs. Most of these cases would have attracted no attention on many commercial farms, as pigs are very apt to suffer from minor ailments, and many recover without any special treatment. An ailing pig, however, does not utilize food economically, but, if given suitable treatment, practically all such pigs quickly recover; if left to take their chance recovery is slower and there is a danger that an ailment at first comparatively

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trivial may develop into a serious disorder. The pigs at the station are therefore kept under careful observation, and if a pig is observed to be off its feed, or to suffer from scour for 24 hours and to lose condition, it receives simple treatment.

The methods of treatment adopted for the indoor pigs in these trials were as follows:—One pig in each of the Lots 8a, 9a and 11a suffered from slight digestive trouble and these three Lots were subsequently allowed out to graze for 2-3 hours daily for a week, at the end of which the ailing pigs had recovered. This treatment, however, failed with one pig in 10a, suffering from a bad attack of indigestion, and with one pig in 12a that had lung trouble. After being allowed out to graze for 2-3 hours a day for a week these two pigs were still ailing, and the lots containing them were therefore withdrawn from the trial and put into an open-air run, where the sick pigs gradually recovered. Two pigs in Lot 17a and three pigs in Lot 19a suffered from digestive troubles, and as, owing to the state of the ground, it was not desirable to turn them out to graze, these two Lots received a simple corrective consisting of 4 parts Epsom salt and 1 part nitre. This was administered every day for a week, at the end of which the disorder had disappeared, but it was subsequently deemed advisable to give these two Lots a dose of the corrective mixture twice a week during the remainder of the feeding period. The quantities used were, up to 80 lb. live weight, $1\frac{1}{4}$ drams per pig per day, over 80 lb. live weight, $2\frac{1}{2}$ drams per pig per day.

Lots 19 and 19a were formed by dividing a litter in which the piglings had been badly reared by their dam and were in an unthrifty condition when the trial started. The outdoor Lot started to improve slowly from the beginning of the trial, whereas the indoor Lot deteriorated steadily until 3 of the pigs became definitely ill, when the Lot received the corrective, subsequently improving in condition. These two Lots demonstrate that unthrifty pigs benefit very greatly from being allowed out to graze even in the depth of winter.

It was found that the pigs kept out of doors during the summer and early autumn (Lots 8, 9 and 11) had a better appetite and made slightly more rapid growth than their indoor mates. The former used slightly less food in

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making a unit of growth than the latter, but the difference, as will be seen from Table 3, was comparatively small. In respect of appetite, growth rate and meal utilization, there was no appreciable difference between Lots 17 and 18, which contained good pigs kept out of doors during the late autumn and early winter, and their indoor mates, but the unthrifty pigs in Lot 19 made better and more economical growth than the comparable Lot 19a.

As the autumn advanced, the outdoor pigs showed less inclination to graze, remaining in their huts whenever the weather was wet or cold. During the autumn and winter, the pigs did an excessive amount of damage to their runs by treading; parts of the runs were completely denuded of herbage and failed to recover during the following summer.

Practical Significance of the Results.—The outdoor system of management fits very well into the economy of some farms, and on these it is obviously good policy to run young pigs out of doors for two or three months after weaning. The practice is sound even during the winter months, for although at that time of the year there is no appreciable difference in the meal consumption of outdoor and indoor pigs, the former are less likely to suffer from digestive troubles.

Unfortunately there is a very large number of farms where the outdoor system does not fit conveniently into the economy of the farm, and many others where considerable expenditure would have to be incurred before that system could be put into operation. The results obtained in this investigation indicate that, providing indoor pigs are kept healthy, their meal consumption is not greatly in excess of that of outdoor pigs. The small difference does not warrant any serious interference being made with the general economy of the farm, or any appreciable expenditure being incurred in order to provide outdoor accommodation for young pigs that it is intended to fatten. It would appear to be a better commercial policy in such instances to concentrate on developing a system of indoor feeding and management under which the incidence of digestive troubles and other ailments is reduced to a minimum. This aspect of the question is at present being studied at this station.

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It is a very different matter with young breeding stock; with them health is a primary consideration. The evidence is that the conditions under the outdoor system are more favourable to health than are those under the indoor system. Whenever possible young breeding stock should be run out of doors, and a certain amount of expenditure is justified to provide the necessary facilities.

A run out on grass has also a special value for ailing and backward pigs. The benefit derived from their being allowed out to graze is sufficiently great to warrant special facilities being provided. Where it is convenient, however, the method followed in these trials will suffice, viz., to turn such pigs out into an enclosure adjoining the building for a few hours a day.

REFERENCES

(Annual Reports by the present Author)

1. *Jour. of S.E. Agric. Coll.*, No. 33, January, 1934, p. 69, Expt. No. 21.
2. Do. do. do. do. p. 66, Expt. No. 30.
3. Do. do. No. 35, January, 1935, p. 66, Expts. Nos. 31 and 43.

COUNCIL OF AGRICULTURE FOR ENGLAND

THE Forty-Fourth Meeting of the Council of Agriculture for England was held at the Middlesex Guildhall, Westminster, on Thursday, May 23, 1935, *Lt.-Col. Sir Merrik Burrell, Bart., C.B.E.* (West Sussex), in the Chair. Sir Merrik was at this meeting elected as Chairman for the year in place of *Mr. C. C. Smith* (East Suffolk), who was thanked by the Council for his services.

The Minister, *the Rt. Hon. Walter E. Elliot, M.C., M.P.*, the Parliamentary Secretary, *the Earl De La Warr*, and the Permanent Secretary, *Sir C. J. Howell Thomas, K.C.B., K.C.M.G.*, attended on behalf of the Ministry.

Standing Committee.—The existing Standing Committee was re-elected with the addition of two new members to fill vacancies amongst the members representing Landowners. The new members were *Lord Cranworth, M.C.* (East Suffolk), and *Major F. H. Fawkes*.

Minister's Address.—In his statement at the opening of the meeting, *Mr. Elliot* said that there were one or two matters arising out of his last statement which it might be interesting to run over. As regards the Pigs Scheme, the bacon output in the country had risen from 1,750,000 cwt. in 1930 to 2,400,000 cwt. in 1934. The estimated output for 1935 was now 2,900,000 cwt. This was a remarkable expansion, and he was delighted to find, in speeches by responsible persons, that the trade in British bacon was every month improving and the quality was coming nearer and nearer to that which the market demanded. 1,689,000 pigs were contracted for in 1935 and the total was now 1,854,000; now, the Pigs Board was offering to enter into contracts with curers for a further 180,000 pigs. The Minister added that both the Pigs and the Bacon Boards had made representations as to alterations in the control of foreign imports. The development scheme for the pig industry had been exhaustively canvassed and amended to meet several points of difficulty; it was now being re-submitted in an amended form.

As regards milk, the control of imports of processed milks had been tightened up since the last Meeting of the

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Council, and the Accredited Producers' Scheme and Attested Herds' Scheme, aiming at improvement in the quality of the milk supply, had been started. He would not anticipate the discussion on milk improvement which would follow later, though he would just say one thing, namely, that the conditions of those labouring in the whole industry of agriculture continued to show steady improvement. There were now 43 out of the 47 counties in England and Wales that had better labour conditions than existed eighteen months ago, which indicated that the industry as a whole was doing its best to share with all those engaged in it the improvements which had taken place, and, he thought, even to discount improvements which it is hoped would take place in the future. Unemployment insurance for agricultural labourers had been accepted by the Government in principle. This illustrated the improved spirit of co-operation which was showing itself among all sections of those engaged in the industry.

As regards sugar-beet, he had spoken on the question of the subsidy at the luncheon of the Sugar-beet Society. The Council would not expect him to give any verdict upon the question. The Cabinet and individual Ministers had to judge on these issues, of the gravest importance to a great section of their fellow countrymen, and they had now to preserve an open mind and to try and appreciate all the factors of the situation.

On the question of meat imports, the Council would be aware that negotiations with the Dominions were actively in progress. These were so important that the Prime Ministers of the countries concerned were being called into conference and were giving their first-hand attention to it. This fact showed the rising importance of agriculture in our national economy. Agriculture was not of less importance than the great questions of peace and war which were being considered to-day. He wished to say again that the White Paper on the meat situation stated in uncompromising terms the intention of His Majesty's Government to safeguard the position of the United Kingdom live stock industry. The recommendations in that Paper covered a very important point, namely, whether the matter should be dealt with by a high tariff, or a levy subsidy as is the principle of the Wheat Act. The question was being greatly canvassed just now in reference to other branches of agriculture. Should it be a high tariff or a low

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tariff; a tariff, the whole proceeds of which were paid into the Exchequer for revenue, or merely an earmarked tariff, the proceeds of which were paid to the producers in the industry concerned? The Minister then stated his reasons why the latter kind of tariff was more likely to succeed. It was, of course, open to the criticism that it involved organization, because if money had to be collected and paid over to an industry a greater degree of work was necessary than if the money were collected and not so paid over. That was true, and if great weight were given to that consideration it would mean the rejection of a low tariff and involve deciding on a very high tariff, because the tariff necessary to give adequate protection must be a very high one in cases where we cannot produce, or do not produce, a majority fraction of the amount of the commodity consumed in this country. Where we produce a large proportion, or could rapidly expand to a large proportion, then the case was quite different. Take potatoes—95 or 96 per cent. of our demand was normally supplied by the home producer and there was, therefore, no danger of a rise in prices which would throw a heavy burden on the home consumer and might turn him or her forever against the policy of a reasonable remuneration to the home producer. In the case of horticultural products, a high tariff, imposed because there is a very rapid power of expansion, makes it quite certain that the home consumer cannot suffer in any way from an undue rise in the cost of living. Indeed, the expansion in some cases has been rapid, and one of the problems of to-day is that of the low return received in many cases from market-garden produce. It is not from the higher cost of produce to-day that people in general are suffering, so much as from the fact that an unduly low return to the primary producer leads to no increase, or, indeed, to a falling off, in the production of vital and health-giving foods here at home.

When we come to the great staples, however, he would stand firmly to the definition that the Government's object was to encourage the maximum supply of foodstuffs to the consumers in our market at the lowest prices consistent with a reasonable remuneration to the home producer. That statement meant that, while that policy held, this country would adopt a low tariff earmarked for producers instead of a high tariff, because the former enabled foodstuffs to be supplied to the consumer at the lowest price

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consistent with that policy. Comparing that price with the courses of prices in other countries of great agricultural efficiency, producing under very low cost conditions, we found that, as regards wheat, in France, in the first half of 1933, it was 20.6 gold francs per quintal, in Germany 23.7, in Italy 26.2, and in London 9.6. If we had used the high tariff method to bring the price of wheat at home to the present-day figure, the price of the quartern loaf would have been $2\frac{1}{2}d.$ more than it is now as against the present burden, which is $\frac{1}{2}d.$ The price of the loaf in 1930, the last free trade year, was $8\frac{1}{2}d.$; to-day it was $7\frac{3}{4}d.$ He claimed that the present policy of low tariff was more likely to produce a policy of continuity than the high tariff.

Turning to beef, the Minister said that a rise of 5s. per live cwt. for home-killed under high tariff methods would have forced up imported beef by at least 9s. 4d. per cwt.

As regards butter, its consumption in 1934 in this country was 25 lb. per head as against 15 lb. in Germany. Did the Council wish him to put the butter consumption of this country back to where it was in 1929, when it was 18 lb. per head? That would be no policy on which to build a solid agricultural structure to last for five, ten, fifteen, or twenty years. As regards the butter price in 1933, taking London as 100, it was 194 in Berlin and 260 in Paris. These figures showed the reasons why the Government, on many of these important matters, comes down not to what is called "a straight tariff"—because there is neither a straight nor an unstraight tariff—but to a policy of a low tariff earmarked for the producer rather than a high tariff earmarked for the Treasury.

Everybody knew that there was a great field for increased consumption of foodstuffs in this country, though that depended largely on employment, and employment depended not merely on agriculture but on the general condition of the country, and we in agriculture could not, and would not, set ourselves against an improvement in the general prosperity of the country, remembering that 93 per cent. of the people lived in the towns and 7 per cent. in the country. We had got this country on the basis of a very low cost of living, which the Minister thought was lower than the economic facts of the world fully justified. Many great staple products were coming here below the cost of production. When the prices in this country were compared with those of others which depended solely on

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their own production, we had, as consumers, a great advantage, and it was an idle dream to expect our housewives readily to accept prices raised by means of high tariffs or anything else. The Minister added that he had run over these points because they explained the basis upon which the Government was negotiating with other countries, so that the Council would understand what was in the minds of the Cabinet and would appreciate, therefore, the action that was being taken.

The Chairman thanked the Minister on behalf of the Council for his address.

Report of Cattle Diseases Committee of the Economic Advisory Council.—*Mr. Clement Smith* proposed the adoption of the Report of the Standing Committee on the subject of the Cattle Diseases Committee Report of April, 1934 (see Appendix I, p. 366). He went over the chief paragraphs and their recommendations, welcoming the Accredited Producers' Scheme of the Milk Marketing Board and expressing the hope that the Ministry of Health would speedily co-operate by making certain other necessary changes in their regulations. *Mr. C. H. Roberts* (Cumberland) said that he dissented from Paragraph 17 as, in his view, the Attested Herds' Scheme was a complete failure. By April, he was told that there had been 14 herds attested out of some 140,000 registered producers. It was, of course, an easier thing to produce clean milk than to produce safe milk, but something more should be done. The scheme, indeed, was not workable. As a first step, he would suggest that the Minister should be content with the standard of freedom from disease which was required in the case of Grade A (T.T.) herds: give these the extra bonus of 1d. a gallon. At present the scheme was too fine-drawn altogether. If the extra 1d. were given to such milk sold from a Grade A (T.T.) herd as was not sold at the special price of that milk, but under the ordinary Milk Marketing Board contract, then there would be a strong inducement to eliminate tuberculosis. If this course were not approved, there were other schemes, such as the Holland scheme, where the Dutch Government gave owners about half a florin per cow towards the expense of testing and gave them free tuberculin. In one province, last week, he found that some hundreds of herds were tubercle-free. The Standing

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Committee said it would be quite content to wait for a year or two, but this money was provided only for four years, and to dawdle on with a futile scheme was, he considered, ill-advised trifling with the public health of the nation. *Mr. Christopher Turnor* drew exception to the statement in Paragraph 4 of the Report as to the high percentage of cows affected with tuberculosis. A much less alarming statement to put out was that about five cows in a thousand yielded tuberculous milk. It should be remembered that the tuberculin test was by no means a certain one. He had had cows which had reacted to the test and which on post-mortem had shown no signs of tuberculosis whatever. Sanitary inspectors required a course of instruction, and clearer directions should be given to the producer as to the best means of clean milk production. The inspectors rather concentrated on buildings, to which, he thought, attention was not so necessary as to appliances. *Lord De La Warr* said that in regard to clean milk policy there were two distinct problems. First, to grade up the milk supply and, then, to rid the herds from tuberculosis. It was with the manner in which we were trying to approach the second that dissatisfaction had been expressed to-day. He thought it quite clear that the Council's feeling was that the Attested Herds' Scheme of the Ministry would not do the work for which it was designed. He would say that the scheme would be amended. He was not able to indicate exactly how that would be done, but he could say that there would be greater inducement given to farmers to enter the scheme. Instead of saying there should be free tests by the Ministry, after there had been two complete tests free from tuberculosis made by the owner, the Ministry might say that when in one test there was 80 to 90 per cent. of freedom, the Ministry would then come in with their free tests. This was not an announcement of policy, but an indication of the sort of lines on which the Ministry was thinking. On the point of amending the regulation that Grade A herds should not have in them any cow which had reacted to the tuberculin test, he would say that that matter would be gone into, and he hoped an early announcement would be made. As regards the revision of the Special Designations Orders, that again would be negotiated with the Ministry of Health, and a quite early announcement might be expected about that. He was sorry to say that there was likely to be no Parliamentary

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time for legislation as regards pasteurization just at the moment, and there was a big chance that the whole situation would be altered by the great success of the Accredited Producers' Scheme. As regards the standard of tuberculin, a Bill had been introduced into the House of Lords to deal with that subject, and there was every chance that the Bill would be passed in the present session. He congratulated the Standing Committee on their excellent Report. *Mr. J. M. Paine* (Bucks.) said he had a tubercle-free herd at the moment. At the last test there were two reactors, and the time before there had been five. The seven cattle went into market and passed on to someone else. How could tuberculosis be eradicated from the country that way? *Mr. A. Matthews* (Hereford) asked what was being done as regards testing imported cattle. *Lord De La Warr* replied to these points that the Ministry had not yet tackled the problem of freeing the whole country from tuberculosis. As regards testing imported cattle, *the Chairman* said he did not think that really arose out of the Report.

The motion was put to the meeting and carried.

Sugar Industry Report.—*The Chairman* suggested to the Council that there should be a full discussion on the Report, and the resolutions on the agenda paper on this subject might be withdrawn. This was agreed to, with the exception of Lord Cranworth's resolution, which was dealt with separately. *Mr. George Dallas* moved the adoption of the Standing Committee's Report on this subject (*see Appendix II, p. 371*). He said that the great mass of people had not awakened to the value of the sugar-beet industry to the country. We had been told time and again that the subsidy had cost the country £50 million, and that we could have bought the sugar for probably less than half that sum in the open market. All that was misleading. The sum included every £ of remission of excise duty that had been made. The £50 million was not a direct tax out of the pockets of the people. More than half was remission of excise duty, which would only have been realized if the sugar, to make up the amount required, came from foreign countries and not from the Dominions or Colonies. The cost of sugar in 1923 was 5½d. per lb.; to-day it was 2½d. per lb., of which a 1d. was revenue tax, which was cheaper than sugar had ever been in the history of this country. If

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sugar had remained at the price it was prior to the introduction of the subsidy, it would have cost the consumers of this country £54 million a year. What the public had to realize was that if the whole industry were stopped, sugar would not remain at its present price; for every 1d. per lb. on the price, it would cost the country £18 million a year. If the industry were killed, sugar would rise in price and the country would pay very dearly for it. A further point was that there were tens of thousands of people at present enjoying employment and wages, although not directly employed in the beet industry, who would be drawing the dole if the industry were stopped. Two factories he could name had spent about a million pounds on machinery purchased within a few miles of the Minister's own constituency on the Clydeside. Thousands of engineers had obtained their living out of the sugar-beet industry. Three million tons of coal and coke had been consumed, and 65 million jute bags had been supplied by the people in the Dundee district. Forty million tons of traffic had been transported by road and rail, and one million tons of limestone had been quarried and used in the industry. The advantages of this business were spread through every part of the British Isles. Then there was the spending power of the people who received wages to be considered also.

The question had been asked why farmers did not turn to some other crop as sugar-beet was uneconomic. There were no countries in the world except Java, Peru and San Domingo which were, at the present time, producing sugar under economic conditions. It was practically always being dumped on the market at less than the cost of production. As a matter of fact, the agriculturist could not turn to any other crop, and Mr. Dallas gave his reasons for saying so. He added that the only argument that could be brought against the industry was that it had damaged international trade and shipping, but there was no foundation in that argument. The importation of sugar in 1923 was 31 million cwt., and that for 1934 was 40,750,000 cwt. He was not defending the present subsidy or its allocation. He was defending the principle of the subsidy from the basic position of the loss to the agricultural worker if the industry were closed down. It would mean complete ruin to thousands of small-holders in different parts of the Eastern Counties.

Lord Cranworth said he found himself in entire agree-

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ment with the Report and with every single word that Mr. Dallas had spoken. He made certain other points, and drew the Council's attention to the unanimity that existed all over the country in favour of the industry being continued. He asked that his own resolution on the paper might be put. This was agreed. *Mr. J. W. Payne* (Isle of Ely) pointed out that the crop was particularly a small-holder's crop in his county, and many of these were ex-service men. *Major S. V. Hotchkin, M.C.* (Lindsey) also spoke on behalf of the small-holders in his county, and said that the chief thing that had saved their farms was sugar-beet. In six counties, there were 84,000 acres of small-holdings, and in one county sugar-beet was one-fifth of the total acreage of small-holdings; it varied, in fact, from one-fifth to one-eighth. In the Fenlands, the small-holder had reduced his acreage of potatoes and had grown sugar-beet instead. If he now stopped sugar-beet he would not be able to go back to potatoes, and there was nothing else. *Lord Eltisley, K.B.E.* (Cambs.) said he thought the Greene Committee's Majority Report no more nor less than a Treasury Report. It took no account of the unemployment question or the hardship to farmers. In Cambridgeshire, they had more small-holders than in any other county, and sugar-beet was their second largest arable crop. They had built a road across the Fens at their own expense in order to carry the sugar-beet off the land. Discontinuance would mean nothing short of a disaster. He added that a very small rise in the world price of sugar would solve the whole question. *Mr. T. P. Gilbert* (Kesteven) said that they would be in despair if it were not for their confidence in the Minister of Agriculture. *Mr. A. Symonds* (West Suffolk) said that in his county half the small-holders would be bankrupt if the industry were terminated. *Lt.-Col. G. J. Acland-Troyte, C.M.G., D.S.O., M.P.* (Devon) said they realized in the West how disastrous the stoppage would be, and that the West completely supported the East on this matter. *Mr. John Beard* said he had attended three conferences and seven meetings recently at which such subjects were discussed, and he had never heard a single dissentient voice against the industry. He was not disturbed at all about the subsidy. The fact was that people were now staying on the land instead of leaving it, and that, for the first time since 1921. In twelve or thirteen years, 190,000 men had left the land; unfortunately, in the vast majority of cases, to

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draw unemployment pay. He looked forward to the day when 250,000 men would go back to the land, because we should then be producing things on the land that at present we were buying from abroad. *Mr. Christopher Turnor* pointed out that it was entirely incorrect to say, as had been said, that £40 million had been distributed amongst the farmers of England in the form of subsidy. *Mr. R. G. Patterson, O.B.E.* (Staffs.) drew attention to the argument against the subsidy that sugar-beet was an uneconomic crop. If that were so, the same argument would apply to wheat and beef, and any other commodity on which there was direct or indirect assistance. *Mr. George Dallas*, in winding up the debate, drew attention to the point that the remission of excise duty in this country was exactly the same as the remission of such duty in the Dominions and Colonies. If we stopped the remission of excise duty for our home production, could we continue to do it for Dominion or Colonial production? If we had not the money to subsidize ourselves, we had not the money to subsidize others.

The Report was then put to the meeting and adopted. *Lord Cranworth* then moved the following resolution:—

"That this Council would view the destruction of the Sugar Beet Industry as a disaster to British Agriculture, and trusts that His Majesty's Government will take such steps as may be necessary for its preservation."

It was seconded by *Mr. F. Sole* (Isle of Ely) and carried unanimously.

Consumers' Committee's Report on Milk Marketing Scheme.—*Mr. George Dallas* moved the adoption of this Report from the Standing Committee (*see Appendix III, p. 373*). The Report was put to the meeting and adopted.

Recent Increases in Vegetable Production.—*Mr. Cecil Robinson* (Holland) moved the adoption of the Standing Committee's Report on this subject (*see Appendix IV, p. 373*). *Lt.-Col. G. H. Long, O.B.E.*, said that, in paragraphs 4 and 5 of the Report, great stress was laid on the necessity of careful planning in vegetable production and marketing. What he thought we suffered from was not so much over-production but under-consumption, and under-consumption was entirely due to high retail price. The price of best quality cabbage at Covent Garden that morning would be $\frac{1}{4}$ d. each, and if the Minister inquired of his wife what she paid for cabbages he would find it was

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3d. or 4d. This enhancement of price went on, not in luxury articles, but in vegetables that were the food of the great mass of the people. *Mr. W. R. Smith* said he would like to emphasize the point made by the last speaker, because he thought it the most important phase of the question. Unless some steps were taken to relate production to consumption in these products, sooner or later chaos and disaster would overwhelm us. He could say that in the production of vegetables and salads this country could put on the market a product, both as regards quality and form, that was equal to anything produced elsewhere, and superior to most. There was not, however, sufficient order in our marketing, and supplies were landed at markets which were quite beyond the possibility of the markets' consumption. Consequently, prices fell, and the efforts of the industry in production were rendered largely negative. This year many acres of cabbages had been ploughed in because the market could not absorb them. It was something approaching a tragedy to those who cultivated the soil on efficient lines, and the public should know that our agriculturists were efficient in their production. Planning was necessary so that the industry would grow and develop, and proceed towards prosperity rather than to disaster.

The Report was then adopted.

Retail Price of Milk.—*The Rt. Hon. Lord Strachie, P.C. (Somerset)*, moved—

"That this Council regrets that the retail price of milk is fixed by the majority of retailers to the detriment of producers and consumers of milk. And further requests the Minister of Agriculture to take the necessary steps to remedy this injustice."

His Lordship said that while producers had the prices fixed at which they could sell their milk, the retailers, or the majority of them, in any particular district had the right to fix for themselves the retail price of milk. He thought producer-retailers were in a very much worse position than the others. These men had to pay a levy for April of 3½d. per gallon, and this, he was informed, was payable on milk used for calves and other purposes on the farm. On a 600-gallon cow, the levy per annum would amount to about £10. *Mr. R. Bruford* (Somerset) formally seconded the motion. *Lord De La Warr* said that the whole question of retail prices had been referred to the Great Britain Reorganization Commission on Milk, with a view to obtaining information in the very near future which would enable

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the Government to deal with all important matters in connection with the scheme. Lord De La Warr added that, with regard to Lord Strachie's remark as to the levy on milk consumed on the producers-retailer's farm, so far as he understood the operation of the scheme, the levy was not made on such milk, or on milk sold to the producer's own servants. *Mr. A. Symonds* said they were very dissatisfied in the Eastern Counties with the levies they had to pay on milk.

The resolution was put to the meeting and carried.

Attested Herds' Scheme.—In view of the statement by the Parliamentary Secretary (see above), *Mr. Charles Roberts* withdrew his resolution on this subject, which ran as follows:—

"That as the conditions attached to the Attested Herds' Scheme are so ill-considered as to make the Scheme in practice a failure, the Council is of opinion that the Minister should now amend the Scheme and provide that all milk sold under the regulations of the Milk Marketing Board from farms holding Grade A (T.T.) or Certified licences should qualify for the additional bonus of 1d. per gallon."

Insurance of Agricultural Workers.—*Mr. Cecil Robinson* moved:—

"That this Council strongly recommends the Government to give effect, as soon as possible, to the findings of the Commission with regard to the insurance of agricultural workers."

Mr. W. Holmes seconded. He said that on this question the agricultural workers were beginning to feel that they had been betrayed. Millions of pounds were being poured out in other ways, and yet all that the Government gave to the workers was a statement that they were in favour of insurance of agricultural workers in principle. If war were declared, the agricultural worker would be put into the Army. Why should he not be given the same advantages as other workers in times of peace. Without a scheme, many workers next winter would have to submit themselves to the tender mercies of Public Assistance Committees. Many of them were absolutely opposed to the principle of seeking public assistance.

The resolution was put to the meeting and carried.

Derelict Land in Hampshire.—*Mr. H. W. Thomas* (Hants) moved—

"That there being about 3,000 acres of land derelict in the county of Hampshire, this Council is in favour of this land being acquired and devoted to some useful purpose."

He said that this land, which was one estate, had been of considerable value, as shown by the tithe payable on it of

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nearly 5s. an acre. The Ministry had been asked but would not acquire this land, and the county itself could do nothing. *Mr. John Beard* seconded the motion, and said that this derelict estate was a scandal. The land would support a large number of families if divided into small-holdings. The seeds of the weeds on it were a great cause of trouble to neighbouring farmers. *Sir A. G. Hazelrigg, Bart.* (Leicester) intervened with a question as to whether the Hampshire County Council had been consulted and were supporting Mr. Thomas's representation. It seemed to be a local matter rather than one for the Council of Agriculture. *Mr. Thomas* replied that he was raising the question with the consent of the County Agricultural Committee, of which he was Chairman. *Mr. A. Goddard, C.B.E.*, said he did not like passing a resolution of this character without knowing more about it. It seemed to him a local problem. *Mr. R. Bruford* asked why the county council had not acquired the land for small holdings. *Lord De La Warr* said he remembered that, when debating the Land Utilization Act, 1931, in the House of Lords, this estate was the focal point for the whole of a discussion on a particular clause. It was then considered to be of real national significance that a large tract of land should be left in this state of neglect. The reason why the Government had not availed itself of the powers under the Act was that it had decided not to use them as a matter of general policy. *Mr. Bruford* then moved that this matter be referred to the Standing Committee of the Council for investigation, and *the Chairman* suggested to Mr. Thomas that he might withdraw his resolution and be content with calling the Standing Committee's attention to it. *Mr. Thomas's* objection to that course was that there would not be another meeting of the Council probably until next December. *Mr. Dallas* and *the Chairman* assured the mover that if, on any matter which the Standing Committee took up, there was need for immediate action, the Committee would not hesitate to take it on behalf of the Council. *Mr. Thomas* withdrew his motion on this understanding.

Home-killed Meat for the Forces.—*Mr. W. Hearle* (Cornwall) moved—

"That on account of the prevailing very low price of fat cattle, the Council renews its application to the Government for arrangements to be made for the supply of home-killed meat to the Home Forces."

He said that, when this matter was considered by the

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Council last time, there was a large difference between the price of home-killed meat and imported meat. To-day, there was much less difference, and he did not see why the Government should not use home-killed meat in preference.

Mr. A. Matthews seconded the resolution. *Sir Arthur Hazlerigg* said that the Council might think it curious that the Standing Committee did not bring anything before them upon beef this time. The position was that the Committee stood on what they said at the last Council Meeting and nothing had since changed their views. He supported the motion. *Mr. R. Anderson* (Northumberland) also supported it.

The resolution was put to the meeting and carried.

APPENDIX I

Being a Report from the Standing Committee of the Council of Agriculture for England on the Recommendations of the Committee of the Economic Advisory Council on Cattle Diseases

1. In November, 1932, the Prime Minister appointed a Committee of the Economic Advisory Council to consider what practical measures could be taken to secure a reduction of disease among milch cattle in the country and to report upon any changes desirable in the existing administrative practice, and, in particular, upon the value and practicability of methods of reducing the incidence of bovine tuberculosis and improving the milk supply. The Committee consisted of Sir Frederick Gowland Hopkins (Chairman), Sir Merrick Burrell, Bt., Professor E. P. Cathcart, Dr. A. Stanley Griffith, Sir Charles Harris, Professor J. H. Jones, and Major-General Sir John Moore. It reported in April of last year and its Report was presented to Parliament in the following month, Cmd. No. 4591, price 2s. 6d. There can be no doubt whatever that the inquiry which the Committee conducted was of a most careful and searching nature, and that their recommendations are of great importance to the industry, particularly to that part of it concerned in the production of milk.

2. Before stating the Standing Committee's views for submission to the Council on certain of the problems, it will be useful to give a brief summary of the principal findings and recommendations, so that members of the Council may have a fair picture of the position before them. First, it should be said that subsequent to the appointment of the Cattle Diseases Committee, (1) the Milk Marketing Boards in England and Wales and in Scotland had been set up, and (2) the Government had decided to provide £750,000 to be used in four years in an effort to obtain a purer milk supply. The Committee had thus to report at a time when the industry was undergoing a number of important changes. They met this position by deciding to confine their inquiries to questions concerning a long-time policy only.

3. The value of the milk supply is conservatively estimated at £64 million a year, and the Committee recognized that in dealing with so huge an industry, if their recommendations could accomplish any considerable reduction of disease, it would mean a large economic gain to the nation. They first set about an analysis of the causes of the disposal of dairy cows from herds and found that, in the sample of herds containing 79,000 cows for which they had figures,

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the wastage attributable to disease alone was no less than 58 per cent. Included under this head of disease was sterility (23.8 per cent.), tuberculosis and Johne's disease (9.7 per cent.), udder disease (7.7 per cent.), tuberculin test (3.6 per cent.), abortion (3 per cent.), and miscellaneous (10.4 per cent.). The chief single diseases responsible for losses to farmers, through their having to weed out diseased stock, and through loss of milk, were reckoned to be tuberculosis, contagious abortion, Johne's disease, and mastitis. With cows finely-bred to produce 1,000 gallons of milk or more a year, the heavy strain to which they were subjected, because of their high milk yield and annual calf, made them, the Committee considered, easy victims to disease; and the high incidence of it in such cases was, therefore, simply explained. In other cases, it appeared to depend most on faulty housing conditions or faulty management, including allowing contact between different herds, or admitting newly-purchased cows into the herd without proper quarantine and observation.

4. Dealing first with bovine tuberculosis, it appears that 40 per cent. of cows in dairy herds are affected in greater or lesser degree, whilst the incidence in different herds range from complete freedom to 100 per cent. If the disease were eradicated in cattle, it is likely to disappear in swine, horses, and goats. The Committee reckon that at least five cows in a thousand yield tuberculous milk, and that as a result of mixing their milk with that of the others a much larger percentage of the quantities of milk delivered in bulk would be liable to give tuberculous samples.

5. As regards contagious abortion, cattle appeared to be infected with it to about the same extent as with tuberculosis, namely, 40 per cent. It is possible, however, to secure a high degree of immunity by a process of inoculation, but, as living germs are employed in this process, it should only be used in heavily-infected herds. Further research work is being undertaken.

6. As regards Johne's disease, no cure is known. The disease, however, is not so widespread as either tuberculosis or abortion, and it was hoped that before long a reliable test of the presence of the disease might be discovered. Research is going forward.

7. The fourth disease—mastitis—was reckoned by the Committee to be present in about 30 per cent. of the milking cattle of the country. Outbreaks of acute infection can be controlled by the segregation of the uninfected members of the herd and by the use of vaccines, though these apparently are of doubtful efficacy. Many cases of mastitis are discoverable only by laboratory tests of milk; and such tests are essential in the management of suspected herds, and the spread of infection throughout the herd can only be prevented by milking infected cows last.

8. The Committee recognized that with regard to the diseases other than bovine tuberculosis, these could be dealt with provided tests were elaborated which would reveal them in their early stages. That condition was already fulfilled in regard to contagious abortion and mastitis, and every attempt the farmer made to eliminate these diseases should be encouraged. A concerted scheme run by authority could only deal with one disease at a time. If four diseases were attacked simultaneously, it would mean dividing all affected herds into four classes of animals, and some individuals might easily have two diseases to be dealt with at the same time. Whatever course individual farmers might adopt, therefore, it was desirable that the State should deal intensively with one disease at a time, and the first disease selected should be tuberculosis.

9. The Report then proceeds to a comparison of the dietetic value of pasteurized as against raw milk, both for the adult and for children. On this important matter, it arrives at the conclusion that there was not sufficient evidence to support the presumption that pasteurization is harmful from the point of view of human nutrition, though the Committee did not regard the matter as thereby disposed of. In

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this connexion, the Council will note that a Milk Nutrition Sub-Committee of the Milk Marketing Boards has been set up "to consider and take such steps as may be practicable for the investigation of the nutritional value of milk in connexion particularly with schemes for the supply of milk at reduced rates which are now or which may hereafter be in operation." The object of this inquiry is to ascertain the effect upon health of the consumption of milk in varying quantities, and to obtain such further evidence as may be possible as to the relative nutritional value of raw as compared with pasteurized milk. This matter, therefore, may be regarded as now proceeding to a final solution.

10. Proceeding, the Report re-states the three major proposals which have been made for improvement in the existing legislative requirements for milk, viz.:—

- (1) an expanded and improved veterinary service for the clinical inspection of dairy cattle;
- (2) an active policy aiming at the eradication of bovine tuberculosis; and
- (3) the better grading of milk and the pasteurizing or sterilizing of bulked milks only in approved plants; and conferring on large urban authorities the right to require pasteurization of all milk not Certified or Grade A (T.T.) sold within their boundaries after two years' notice in cases where that milk is not supplied from tubercle-free herds; the power to exercise that right, however, to be deferred for three years.

11. Considering these three proposals in order, the Cattle Diseases Committee then recommend as regards (1), routine veterinary clinical inspection of milking cows to be made obligatory for all local authorities; the veterinary service under the immediate control of local authorities to be expanded, with power to the Departments of Agriculture to co-ordinate the activities of local authorities; the testing of herds with tuberculin for the purposes of the Milk Designations Order to be transferred to the expanded veterinary service and the granting of licences under the Order to be placed in the hands of county councils; only whole-time officers to be eventually employed in the veterinary service, part-time veterinary officers being allowed as a temporary measure during the period of expansion.

12. As regards (2), the scheme for the eradication of bovine tuberculosis—which should be under the Ministry of Agriculture—to provide for the making of lists of tuberculosis-free herds; to give free advice and tuberculin testing to owners of herds who agree to make *bona-fide* efforts to eliminate the disease or who have eliminated it; to secure to owners of disease-free herds a higher price for their milk than otherwise would be obtained; to endeavour to secure that tuberculosis-free cattle should not be exposed to the risk of infection from other cattle when being moved about the country; to adjust the regulations governing the production of the suggested graded milks with a view to increasing the incentive to farmers to eradicate tuberculosis from their herds.

13. As regards (3) above, the Committee considered that all milk sold for consumption should be sold under one or other of the official designations which it suggested, namely, "Certified," "Pasteurized," "Sterilized" and "Milk (uncertified)." The last category was to be of milk which attained approximately the present Grade A standard. Other milks should not be allowed to be sold for human consumption in the liquid form. Further, the Committee recommended that all milk which had been held in a vessel containing more than 100 gallons of milk, unless derived from a single herd, should be pasteurized before sale for consumption. All county and municipal boroughs, or urban areas whose population exceeded 100,000 and the London County Council should have the right to prohibit the sale of "Milk (uncertified)" after a date not earlier than five years

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subsequent to the initiation of the scheme of tuberculosis eradication (recommended above), provided that it gives not less than two years' notice of its intention. So far as pasteurization itself was concerned, the Committee recommended that this should only be permitted in plants whose design had been officially approved and which had been tested on erection and would be subject to frequent inspection by an official of the sanitary authorities.

14. Among its other miscellaneous recommendations were the following:—

- (a) that the Milk Marketing Board be invited to consult the appropriate Research Council before spending money on research;
- (b) that the Ministry of Agriculture should approve a standard of tuberculin of prescribed potency and purity, and should provide that it be sold only to qualified veterinary surgeons; and
- (c) that the police and the sanitary officers of local authorities and all veterinary officers should have the right of access to dealers' and knackers' premises and to require information as to the source from which any cattle were received and as to their destination.

15. Since the date of the Report, the Milk Marketing Board has put forward its Accredited Producers Scheme, as from May 1, 1935, and the Ministry of Agriculture has issued its Attested Herds Scheme, which came into force on February 1, 1935. Under the former, producers of milk of the present Grade A standard will receive a bonus of 1d. per gallon derived from a levy on all milk. Under the latter, producers are entitled to another 1d. per gallon provided they have their herds attested after official tuberculin test as free from bovine tuberculosis and provided the milk is sold through the Milk Marketing Board; the money for this service being derived from a Treasury Grant. These schemes are entirely different in their aims. The first is designed to grade up the milk supply of the country in a general way: to provide milk which shall be clean. The second, definitely to rid herds from tuberculosis.

16. The Standing Committee agrees in thinking that, after a period of a few years of the Milk Marketing Board's Scheme, the general standard of cleanliness in the production of milk should have been sufficiently raised that no milk below it should thereafter be permitted to be sold for liquid consumption. It will be observed that the Cattle Diseases Committee were in favour, after a period of notice, of requiring all milk produced for liquid consumption to be of a standard not below that of Grade A.

17. The Standing Committee is, however, doubtful as to the success of the Ministry's scheme for attested herds. It feels that progress under it, as it stands at present, will be so slow that the effect on the total cattle in the country will for a long time be little short of negligible. The Committee is, however, content to wait a year or two and watch results, though it would hope that every step possible will be taken by the Ministry to increase the pace. This could probably best be done by giving more assistance to the farmer in aiding his early efforts to eradicate the disease. Increased co-operation between the veterinary staffs of the Ministry of Agriculture and Fisheries and of the local authorities would be of great value in this connection.

18. In the case of the Accredited Producers Scheme, there is one anomaly which the Committee considers must be got rid of, and that is the requirement that herds producing Grade A milk may have no cows in them which have reacted to the tuberculin test, even if these are segregated from the owners' other cattle. A dairy farmer producing Grade A milk who is anxious to place his herd on the Grade A (T.T.) list, may frequently find himself with animals which react to tuberculin which another dairy farmer, also producing Grade A milk, has not, because his herd is not subject to tuberculin testing. It is hoped the Ministry of Health will be quick to make the necessary

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adjustment in this regulation, which acts at present as a deterrent to Grade A herds being raised to the Grade A (T.T.) level.

19. As regards the recommendation of the Cattle Diseases Committee that routine veterinary inspection should be made obligatory on all local authorities, the Committee considers that this cannot be too strongly urged. Several forward counties are already meeting their responsibilities in this direction, but the others, owing to financial difficulties, are likely to be slow in providing the necessary staff. It appears to the Committee that the best way of dealing with this question is for the co-ordinating Veterinary Staff of the Ministry to be strengthened and set to work as speedily as possible to do their utmost to get local authorities into line on this important matter. They will be able to report progress from time to time, and if the financial difficulties of the counties should prove obdurate they can be better met and overcome if they are clearly and publicly stated.

20. As regards the Cattle Diseases Committee's recommendations on the grading of milk and pasteurization, the Standing Committee sees much force in their suggested simplification of grades, namely, Certified, Pasteurized, Sterilized, and Milk (Uncertified). "Certified" milk, under this new grading, would be different from the present "Certified." It would be simply milk which had not undergone any process of heat treatment, was derived from tubercle-free herds, and was of the prescribed standard of cleanliness. It would not be required to be bottled on the farm, but could be sold in sealed containers. The Standing Committee, however, is not in favour of the retention of this term if a better one can be found. "Pasteurized" would be milk which had undergone once only an approved process of heat treatment in a licensed plant. "Sterilized" would be milk which had been raised to boiling point, or higher, in a plant licensed for the purpose and which had undergone no other process of heat treatment; and "Milk (Uncertified)" would be milk of the prescribed hygienic standard which had undergone no heat treatment and was not necessarily derived from tubercle-free herds. The Standing Committee suggests most strongly to the Council that these grades would be more suitable to present conditions than are the old grades, and that it is desirable that all necessary steps be taken forthwith to operate them. Official regulations also require to be made governing the manner of heat treatment.

21. The Standing Committee appreciates also the importance of the recommendation that there should be a clause in the agreements between producers and distributors, safeguarding the former from penalties owing to any enforced decrease in their supplies of milk which may be caused by the elimination from their herds of cows reacting to the tuberculin test.

22. Another recommendation deserving special consideration is that no local authority should be able to enforce pasteurization within its area until those supplying the milk had had fair warning, and had been given a reasonable chance to form tubercle-free herds. The question whether the suggested five years is sufficiently long is, in the Standing Committee view, a debatable one which may be solved by experience in the next year or two. If this recommendation of the Committee is acted on, the matter will become of very great importance to producer-retailers, whose very existence as such will depend upon whether they have freed their herds from tubercle or can combine together to erect thoroughly equipped and efficient pasteurizing plant; they cannot be expected each to instal such a plant.

23. The Standing Committee concurs in, and desires to emphasize, the importance of the recommendation in paragraph 14 (a) above, viz., that research should be undertaken on the advice of the appropriate Research Council. It would, of course, be desirable and proper that the Departments responsible or agricultural research

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should also be consulted. Research institutes now exist for almost every branch of agriculture. The Agricultural Departments, the Agricultural Research Council, the Medical Research Council, or the Department of Scientific and Industrial Research, will know best how to plan the research into any problem which any Marketing Board desires to be solved, where the work could best be done, and the man to whom it seems most desirable to entrust it. A main function of these bodies is to direct and co-ordinate all this class of work, and it would obviously be undesirable for Marketing Boards to initiate and finance research work independently, except perhaps in very rare and exceptional circumstances. Such action would be sure to lead to waste, overlapping, and confusion. It is also undesirable that Directors of Institutes, at which research is carried on, should get to look upon the Marketing Boards as reservoirs from which they can obtain funds without any control from the bodies whose function it is to overlook their work, and to deal with questions of their financial support.

24. As regards the recommendation in paragraph 14 (b) as to standards of tuberculin, one of the difficulties in arriving at uniform results in tuberculin testing is that the material varies in purity and potency. There is no restriction on the importation into this country of tuberculin, nor indeed of any veterinary biological product. The Standing Committee agrees that it is most necessary for legislation to be formulated to rectify this very undesirable state of things.

25. The Standing Committee also supports the recommendation in paragraph 13 (c), which recommends rights as to entry on dealers' and knackers' premises, etc. These powers are required in order to trace the origin of diseases, to control their spread, and to see that diseased carcasses are disposed of in a proper manner.

26. In conclusion, the Standing Committee urges on the Council the general view that, since the Report brings to light so many problems of importance both to producers of meat and milk and to the consumers of these important food-stuffs, its recommendations, especially those which have been dealt with in this Report, should receive the earliest possible treatment at the hands of the Government. It is, no doubt, because the problems are involved and the steps necessary to solve them difficult and complex that they should have met delay. The Committee thinks that no further time should be lost, and that the necessary legislation, with correlative changes in central and local organisation, should at once be taken in hand.

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APPENDIX II

Being a Report from the Standing Committee of the Council of Agriculture for England on the United Kingdom Sugar Industry Report

1. The Standing Committee has had before it the Report of the Greene Committee on the United Kingdom Sugar Industry, together with the Minority Report of Mr. Cyril Lloyd. It feels that, while the whole agricultural industry will welcome so full and careful an inquiry, it should protest with one voice against the recommendation in the Majority Report that assistance to the sugar-beet industry in this country should be discontinued.

2. The Majority Report, signed by two of the three members of the Committee, does not appear at all to realize how important the crop has become as a factor in the new plan of arable husbandry in the country. The beet crop, in fact, is now so essential in practically all arable districts that it cannot be substituted by any other crop except to the detriment of agriculture and to the interests of many thousands of workers, both seasonal agricultural and industrial, who

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would inevitably be put out of employment. In the ten years allowed for the growth of the beet industry, the crop has largely replaced the root break in many rotations. The root break was in the rotations for the purpose of affording an opportunity of cleaning and manuring the land while providing a fodder crop, and the beet crop which is now used for this purpose in place of the swedes, mangolds, or turnips, formerly grown is a "cash" crop and, therefore, specially valuable as providing the funds urgently required by farmers and small holders during the farming year. It also provides, in the dried beet pulp and tops, the necessary cattle fodder to replace that provided by the old root "cleaning" crop, which was always reckoned as having to be grown at a loss. It is true, also, to say that in some parts of the country, dairying has been assisted and extended by having at hand a valuable foodstuff in the form of dried beet pulp. There is no doubt whatever in the Committee's mind that all those who have a competent knowledge of modern agricultural practice regard the beet crop as having introduced a very definite improvement into the technique of arable agriculture.

3. The Standing Committee realizes from the perusal of the Sugar Industry Report that the crop can only under present conditions be retained with the aid of Government assistance. It does not, however, agree that a subsidy at all times and in all conditions will be necessary; nor does it agree that the present subsidy is necessarily the right kind of subsidy in its incidence and operation. In the future organization of the industry, it would prefer to see a system working under which the sugar-beet factories would be run on lines giving them an assured but limited profit and enabling them to work to maximum efficiency by undertaking the refining of their sugar as well as its extraction.

4. In dealing with the sugar-beet question at the present time, it has to be remembered that the price of sugar in this country is a very low one, and that practically all overseas producers, including those who use very low-priced labour, are to-day producing sugar at a loss. This state of things is fundamentally unsound, and in the end bad for all concerned. Moreover, if the price of sugar were at a level which adequately reflected the costs of production in countries with fair labour costs, the assistance given to the sugar-beet industry in this country would probably no longer be required, and the industry would have been established here in a shorter time and with a likelihood of a more prosperous future than in any other European country.

5. In view of this position, the Committee is satisfied simply to recommend that the Council's support be given to the general principle of the Minority Report that the industry be continued. It appears to be the case that, under present arrangements, the Colonies which supply sugar to this country get assistance from the United Kingdom Government which, at its maximum, amounts to 7s. 9d. per cwt. of refined equivalent. If that assistance is continued, the Committee can see no reason logically why the required assistance should not be continued also to the home industry.

6. The specific proposal in the Minority Report is that there should be a remission of excise duty on all home-produced sugar (4s. 7d. per cwt.), plus a levy on imported sugar (amounting to a small fraction of a penny per lb.), which should be applied to raising the price paid by the factory to producers of beet in order to balance their costs of production. Without the examination of possible alternative methods, the Standing Committee is not in a position to comment on this suggestion, though it is clear that with this, as with any other method, any supplementary assistance given to the industry should be made to vary inversely with the world price of sugar; and if and when the position becomes sufficiently favourable, cease altogether.

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APPENDIX III

Being a Report from the Standing Committee of the Council of Agriculture for England on the subject of the Consumers' Committee's Report, dated February 18, 1935, on the Milk Marketing Scheme, 1933

1. The Standing Committee has considered this Report, and is much impressed by the evidence it contains of the increase which is taking place in distributors' margins, notwithstanding the existence of the Milk Marketing Scheme. In its view, the scheme by organizing supplies should aid a reduction rather than give rise to an increase in distributive costs. The Standing Committee has already stated, in an earlier Report, that it considers the Milk Marketing Board to have saved the producing industry from collapse under the strain of pre-Marketing Board conditions. These prevented many milk producers from obtaining remunerative prices, and all of them from knowing for certain that the milk they produced would be sold.

2. The Milk Marketing Board is still striving with large initial difficulties, but, the Standing Committee hopes that in the end it will accomplish its main object of assuring remunerative prices to producers—an essential condition if the industry is to be maintained. The Board is now undertaking further responsibilities under its scheme in an effort to grade-up the quality of milk produced for liquid sale, and, in proportion as this is successful, so the need for some distributors' costly services in cleaning and treating the milk should diminish.

3. The Committee understands that an investigation into the costs of distribution of milk is now being conducted by the Food Council, and that the whole question of the incidence of the Milk Marketing Scheme on distribution will be extensively considered by the Great Britain Milk Reorganization Commission now sitting and, further, that the Minister of Agriculture has asked the last-named body to give very careful consideration to the Report of the Consumers' Committee of February 18, 1935, in formulating any proposals for the improvement of milk marketing.

4. In these circumstances, the Standing Committee recommends that the Council should await the Reports of the two bodies named before giving its considered views on the question of distributors' margins or retail prices.

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APPENDIX IV

Being a further Report from the Standing Committee of the Council of Agriculture for England on recent increases in Vegetable Production

1. The Standing Committee has had again under consideration the question of the growth of increased quantities of vegetables in this country, whereby consumers are ensured of a better supply of fresh and canned vegetables of sound quality. It is now a very well-known and appreciated fact that the tariffs which have been placed on the importation of various vegetables have been of great assistance in extending our acreages of vegetables, and the Table overleaf (p. 374) will show the order of the change which has been taking place.

2. The advantage of increased acreages of vegetables is not only that the crops are grown in this country rather than abroad, but that, because they are grown in this country, they are able to be put on the consumer's table in a much fresher condition than would otherwise be the case. Everybody will agree that freshness in vegetables is the major quality in their attractiveness to the con-

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	1930. acres.	1934. acres.
Beans (green)	14,400	16,800
Peas (green)	56,400	74,000
Cabbage	30,600	37,000
Brussels sprouts	26,300	34,000
Cauliflower and broccoli	14,600	20,100
Celery	6,400	7,500
Rhubarb	7,400	8,200
Carrots	9,000	16,400
Onions	2,000	2,100

summer, but it has yet to be shown by facts and figures what exactly are the merits of fresh vegetables just out of the garden in terms of essential nutritive elements, and this as compared with stale vegetables that have been through two or three sellings, delayed in transport and, possibly, in and out of cold storage. The Committee would like to learn that this question had been taken in hand by such an authority as the Medical Research Council, or the Department of Scientific and Industrial Research, in order that the case for larger, and still larger, supplies of home-grown vegetables may be more soundly established from a scientific and nutritional point of view as well as from a national economic one.

3. A consideration of this position has led the Committee to the view that in the case of fresh vegetables, more perhaps than in that of any other commodity, there is need for careful planning in production and marketing. A district should supply first its own requirements and then supply other near markets with the surplus, so that no time is lost in getting fresh produce consumed. To effect this, an efficient and up-to-date intelligence service working on behalf of the producer seems absolutely necessary.

4. There is, however, another and equally important reason for such an intelligence service, and for careful planning in fresh vegetable production and marketing. It is that, with the aid of the tariffs, certain vegetables are being much more widely grown, especially crops that have been taken in hand by farmers when they used to be grown only by market gardeners and small holders. Unless planning takes place in regard to these products, there is serious danger of over-production with consequent discouragement of the grower and loss to the country.

5. In the view of the Standing Committee, it is foolish merely to leave the question of production-planning and proper marketing of fresh vegetables to be met in a haphazard way by "the law of supply and demand." That can only lead many growers into errors of which warning cannot be given; they cannot possibly know of broad market requirements, or of the changes in the day-to-day and week-to-week incidence of the consumer-demand for their crops at particular markets.

6. In the last Report to the Council on this subject, dated June 1, 1934, the Committee gave details of home production and importations of vegetables with advice as to which of them offered most room for expanded acreages in this country. The information then given may, we think, still be used as a sound guide, and printed copies of the Report are still obtainable. It will perhaps suffice to mention here the principal crops that can usefully be extended. Among them onions appear to present the outstanding opportunity to home growers. Over 10 million bushels are imported, and most of these could well be grown in this country. The chief others are tomatoes, carrots, red cabbage for pickling (and indeed all vegetables for pickling), and horse-radish.

7. It is suggested that increased growth of these vegetables might be encouraged by suitable changes in the tariff and restriction posi-

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tion, e.g., as regards tomatoes by an earlier imposition of the seasonally-increased duty on those from the Canary Islands. As regards onions and horse-radish, vegetables for pickling, of which only comparatively small quantities seem to be grown in this country commercially, there may be a question with the Import Duties Advisory Committee whether it is justified in imposing a tariff on the large proportion of imports in order to assist the extension of the present small acreages in this country. The point, we understand, is whether these, and possibly other vegetable crops which it is desirable that our producers should grow in greater quantities, can be considered as being already "substantially" grown in this country. The Import Duties Advisory Committee may not feel itself able under its statutory mandate to deal with crops which are not already "substantially" grown. If that is the case, then we suggest that the bar should be removed, especially in such an outstanding instance as onions, which, with a greater share of protective duties, could, and would, be grown on very much larger acreages, giving employment to a considerable number of extra workers, the onion being a crop which requires a large amount of hand labour.

8. Governing the whole position in regard to the extension of acreages of vegetable crops, is that of a proper appreciation of the value of vegetables, including salads, in human diet. It is, unfortunately, the fact that the proper cooking of vegetables, where they must be cooked, is still very imperfectly understood. In many houses, the mineral salts in vegetables are thrown away in the cooking water and the dish brought on the table is one mainly of fibre and husks. In the Committee's view, it is a matter of great importance that proper methods of cooking—whereby essential food material, and possibly also some vitamins, are not lost in boiling, etc.—should be stated authoritatively and widely circulated throughout the country. The importance of steaming of vegetables, cooking potatoes in jackets, and using the casserole to a much larger extent, seem certain to be useful points, and, as regards salads, attention should be called to the importance of their being eaten in the freshest possible condition. If a wide and intelligent interest in these matters could be created, the Committee thinks that it would lead to a much larger use of vegetable foods in diet, to the advantage not only of the producer but of the consumer as well.

9. In the Report to the Council dated June 1, 1934, the Committee called attention to the increasing quantities of dried peas which were being imported for the purpose of processing and canning in this country, after which they are sold as "British canned peas." Nothing appears yet to have been done to meet this grave menace to the young and growing industry of British canned fresh peas, the product of our own fields and gardens. There is a very great difference between peas which are brought fresh from the fields and canned the same day, and peas which are grown abroad, dried, processed to become green again, and canned thereafter. Any possibility of confusion between the two in the minds of consumers should not be permitted in the interests of our growers as well as of consumers, and the Committee cannot too strongly again emphasize to the Council the need for some means to be taken to remove the injury.

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MARKETING NOTES

Milk Marketing Scheme: Pool Prices for May, 1935.—The wholesale "liquid" price for May was 1s. 0½d. per gallon, the fraction of one penny representing the purchaser's contribution, under the terms of the contract, towards the fund established by the Milk Marketing Board for milk publicity. A similar contribution was made by producers by an allocation from the Board's funds. The fall in the wholesale price from 1s. 4d. in April was reflected in the pool prices for May. Pool prices and rates of producer-retailers' contributions for the two months, and for May, 1934, when the wholesale price was also 1s. 0½d. per gallon, are given below.

Region	Pool Price (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	May 1935	April 1935	May 1934	May 1935	April 1935	May 1934
Northern ..	9½	12½	10½	2½	3½	12½
North-Western ..	9½	12	10	2½	3½	12½
Eastern ..	9½	12½	10½	2½	3½	12½
East Midland ..	9½	12	10	2½	3½	12½
West Midland ..	9	11½	9½	2½	3½	12½
North Wales ..	9½	11½	9½	2½	3½	12½
South Wales ..	9½	12½	10	2½	3½	12½
Southern ..	9½	12½	10½	2½	3½	12½
Mid-Western ..	9	11½	9½	2½	3½	12½
Far-Western ..	9	12	9½	2½	3½	12½
South-Eastern ..	10	12½	10½	2½	3½	12½
Unweighted Average	9·41	12·09	10·02	2·32	3·56	1·83

Producer-retailers who qualified received credit for level delivery premiums at the rate of one-halfpenny per gallon, as a set-off against their contributions. Accredited producers received a premium of 1d. per gal. in addition to the pool price. The Inter-Regional Compensation Levy was fixed at 1½d. per gal. on "liquid" sales, compared with 2½d. per gal. for the previous month. No levy was made for general expenses.

Quantities of Milk sold during May.—The increase in the quantity of milk sold by wholesale, which has been so noticeable a feature of the Board's operations in recent months, continued during May. Estimated sales during the month were as follows:—

	May, 1935 (Estimated)	May, 1934
Contract Liquid Sales	48,676,946 gal.	45,797,466 gal.
" Manufacturing Sales ..	40,565,392 "	29,699,080 "
Total Contract Sales	89,242,338 "	75,496,546 "
Percentage Liquid Sales	54·5	60·6
" Manufacturing Sales ..	45·5	39·4

MARKETING NOTES

The average realization price of manufacturing milk during May, 1935, was 5·01*d.* per gal., compared with 5·20*d.* in April and 5·47*d.* in May, 1934. Milk manufactured into cheese by farmhouse cheesemakers amounted to 2,187,364 gal. compared with 3,453,613 gal. in May, 1934.

Milk Board Regional Elections.—The four regional members of the Board who were due to retire this year offered themselves for re-election in their respective regions. Mr. Ben Hinds (Vice-Chairman of the Board) and Mr. P. R. M. Jaggard were returned unopposed as members for the South Wales and East Midland regions respectively. Colonel J. F. Duncan and Mr. J. Joyce were re-elected after contests in the Southern and Mid-Western regions on June 1. The normal period of office of a regional member of the Board is three years.

Second Annual General Meeting of Registered Producers.—At the annual general meeting, held on June 6, the accounts of the Board for the year ended March 31, 1935, were presented and adopted. The Report circulated with the accounts stated that milk sold through the Board during the year realised £36,698,931, the quantities dealt with being as follows:—

	<i>Gallons.</i>
Sold by wholesale under contract ...	783,423,794
Producer-retailers' sales	105,941,285
Farmhouse cheesemakers' sales ...	21,319,415
Milk for schools sold direct by producers	2,017,092
Total	912,701,586

Of this total 650,451,983 gallons, or 71·27 per cent., were sold for liquid consumption, and 262,249,603 gallons, or 28·73 per cent., for manufacture. Administration costs were less than one-twelfth of a penny per gallon on all milk dealt with by the Board.

Remuneration was voted to members of the Board for the past year at the following rates:—Chairman £1,200, Vice-Chairman £700, other members £350.

Pigs and Bacon Marketing Schemes: Pig Prices for June.—The contract price for a basic (Class I, Grade C)

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pig in June was 11s. 5d. per score compared with 10s. 11d. per score in May. This price is exclusive of the curers' contribution of 1d. per score towards insurance.

Supplementary Contracts.—In view of the deficiency in the number of pigs contracted for by producers on supplementary contracts, compared with the number required by curers (see this JOURNAL for June, 1935, page 271), the Pigs Marketing Board entered into contracts with curers during May for approximately 160,000 pigs, for delivery in the period May to December, 1935. The Board have now announced that they propose to allow the curers concerned to obtain the pigs on the open market subject to the provisions of the Bacon Marketing Scheme. Curers will be required to make returns to the Bacon Marketing Board of the number of pigs so bought.

Pigs Marketing Scheme Amendments.—The Public Inquiry held by Mr. N. L. Macaskie, K.C., the Commissioner appointed by the Minister and the Secretary of State for Scotland, into objections with respect to the proposed amendments to the Pigs Marketing Scheme, opened on June 13 and was concluded on the following day.

Potato Marketing Scheme: Census of Acreage.—The Potato Marketing Board have arranged to take a census of the acreage of potatoes being grown by registered producers as at June 4, 1935. Steps are also being taken to carry out a comprehensive check of producers' acreages throughout the country.

Hops Marketing Scheme.—At the third annual general meeting of registered producers, on May 24, the Chairman reported that 245,496 cwt. of hops of the 1934 crop had been tendered to the Board, of which 217,327 cwt. were quota hops and 28,169 cwt. non-quota hops. About 30,000 cwts. then remained unsold. Sales realised £1,966,000, giving a return to producers of about 98 per cent. of the valuation of their quota hops.

All the four special members were re-elected unanimously for a further year and remuneration of members for 1935-36 was voted at the same rate as in former years, viz., Chairman £800, special members £400 each, district members £200 each.

Bacon Import Regulation.—Foreign bacon allocations, for the three months July to September, 1935, have now been made provisionally in the light of anticipated home

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and Dominion supplies during that period. In order to balance a seasonal decrease in net supplies from home and Dominion sources, the total foreign bacon allocation has been fixed at a rate about $3\frac{1}{2}$ per cent. higher than that in operation during the six months January to June, 1935. The provisional allocations to individual foreign countries are as follows:—

			Cwt.
Denmark	..	..	970,656
Holland	..	..	136,240
Poland	..	..	114,011
Sweden	..	..	67,403
Lithuania	..	..	42,306
Estonia	..	..	10,756
Finland	..	..	5,736
Latvia	..	..	10,039
U.S.S.R.	..	..	12,190
Argentina	..	..	10,039
U.S.A.	..	..	114,728
Other Countries	..	..	34,696
Total			1,528,800

Home and Dominion supplies in the last quarter of 1935 are likely to be at a higher rate than in the third quarter, and this will involve a corresponding reduction of the foreign allocations for the last quarter.

Government Bacon Import Policy.—An important announcement concerning Government policy in respect of bacon imports was made by the Minister of Agriculture and Fisheries in reply to a question put in the House of Commons, on June 7, 1935. The question and answer were as follows:—

MR. WILLIAM MORRISON.—To ask the Minister of Agriculture whether he is in a position to make any statement with regard to the operation of the bacon scheme.

MR. ELLIOT: The Government have had the Pigs and Bacon Marketing Schemes under review, and they consider that certain developments of the general plan for regulating bacon imports and assisting the home producer might now be made to the advantage of all concerned. They propose that the policy of maintaining a regulated market should be continued, but they are prepared to contemplate, as from the beginning of next year, an increase in the volume of imported supplies, subject to the imposition of a limited charge on imports from foreign countries the proceeds of which would be devoted to the assistance of the home industry as the situation may require. Such an arrangement would involve obtaining the assent of certain foreign countries who have at present a Treaty right to free entry of bacon into the United Kingdom, and H.M. Government propose to open negotiations with the Governments of those countries forthwith.

In explaining the policy to representatives of the Pigs and Bacon Marketing Boards, the Minister stated, that if a satisfactory arrangement could be reached, the assistance

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to be given to the home producer would be related to a volume of home production showing a moderate increase over the 1935 output. As in the case of Wheat Act payments, the assistance per unit would diminish as home production increased beyond that volume.

Mr. Elliot expressed the hope that the new arrangements would assist the Boards in promoting efficiency in production, processing and marketing, and stressed the importance of the Development Scheme in this connexion. He also expressed the view that there was nothing in the proposals to prevent the Boards from settling forthwith the terms of the 1936 pig contract.

Lard Supplies and Prices.—A reduction of almost 42 per cent. took place in imports of lard into the United Kingdom during the first five months of 1935 as compared with imports in the corresponding period of 1934. This reduction was due to a decline in imports from the United States of America, which was only slightly offset by an increase in supplies from other sources. In May, 1935, United States' supplies totalled 52,000 cwt. only compared with an average of 216,000 cwt. per month in 1934, and represented only 37 per cent. of total imports of lard compared with 92 per cent. in the year 1934. The decline in United States' supplies was caused partly by the slaughter of pigs under the "Recovery Programme," and partly by the 1934 drought, which ruined the American maize crop. As a result of the reduction in supplies, the average price of American lard, in London, rose from 25s. 6d. per cwt., in May, 1934, to 62s. 6d. per cwt. in May, 1935.

Potato Supplies and Prices.—Growers' and wholesale prices of potatoes rose very considerably during April and May, 1935. Growers' prices for King Edwards at Wisbech rose from 75s. to 97s. 6d. per ton between the beginning of April and the middle of May, and wholesale prices from 116s. to 129s. per ton. This rise was probably due in part to the riddle regulations prescribed by the Potato Marketing Board in March. Subsequently, as a result of the severe frost which occurred in all parts of the country on May 16 and 17, a further substantial increase occurred, and, by the beginning of June, growers' prices for King Edwards had advanced to 150s., and wholesale prices to 154s. per ton.

In view of the supply position, the Potato Marketing Board, at a special meeting held on May 23, decided to relax the riddle regulations. In the case of the varieties

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King Edward, Red King and Golden Wonder, there was a reversion to the basic riddle laid down in the Potato Marketing Scheme, viz., $1\frac{1}{2}$ in., while for other varieties a minimum riddle of $1\frac{3}{8}$ in. was prescribed. At the same time, the prohibition of the sale of potatoes weighing over 1 lb. was withdrawn.

Following reports of extensive damage by frost to the home early potato crop, consideration was given to the position by the Market Supply Committee, in conjunction with the Potato Supplies Consultative Committee, on which all the interests concerned are represented. Subsequently, the Potato Marketing Board issued a press notice urging growers to keep the markets adequately supplied. These measures, together with reports to the effect that the damage to the early crop was less severe than was at first supposed, have had a steadying effect on prices.

Milk Act, 1934.—Advances amounting to £1,053,315 have, to date, been made to the Milk Marketing Board under Section 1 of this Act in respect of milk used for manufacture (excluding milk manufactured by the Board itself or milk used for cheese-making on farms). Details are given below :—

April 1934 to April 1935 (inclusive)	Butter	Cheese	Milk Powder	C'nd'ns'd Milk for Export	Tinned Cream	All Products
Gallons	65,563,500	83,204,805	10,630,064	7,920,773	2,736,485	170,055,627
Adv'nces (£)	421,260	533,013	38,768	48,872	11,402	1,053,315

The following figures for April, 1935, though not yet complete, show a marked increase as compared with April, 1934, in the gallons manufactured. Advances so far made are, however, less than for April last year, owing to the higher statutory cheese-milk price.

Month	Gallons manufactured	Rate per gallon at which advances were made	Advances
April 1934	10,933,076	*1·5 pence	£65,708
April 1935	19,452,188	*0·82 "	£64,772

* Except for milk used for Milk Powder (·5 pence).

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Under Section 6 of the Act, a sum of £163,390 has, by direction of the Treasury, been paid to date to the Government of Northern Ireland with the object of securing a standard price for milk manufactured into cream and butter at registered premises in Northern Ireland. This sum is made up as follows:—

Period of manufacture, 1934-5	Gallons of Milk used for Cream and Butter	Equalisation payment per gallon to raise price to 5d. (Summer) and 6d. (Winter)	Amount of Equalisation payment
April to September	12,147,258	*Varying from 1'3 to 2'2 pence	£ 101,327
October to March ...	6,047,834	*Varying from 1.88 to 3.0 pence	62,063
Totals	18,195,092	—	163,390

* According to month.

Cheese: Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4.04 pence per pound for the month of June.

Milk-in-Schools Scheme.—Payments amounting to £229,415, have been made to date to the Milk Marketing Board under Section 11 of the Milk Act by way of compensation in respect of the Board's expenses in supplying milk to school-children at reduced rates. Details are given below:—

Month	Gallons	Wholesale price per gallon	*Loss to Board per gallon	Rate of Compensation per gallon	Exchequer payment
1934		s. d.	d.	d.	£
October ...	1,964,962	1 4	10	5	40,937
November	2,441,807	1 4	10	5	50,871
December	1,754,208	1 5	11	5½	40,200
1935					
January ...	2,120,278	1 5	11	5½	48,590
February...	2,130,195	1 5	11	5½	48,817
Total to date	10,411,450	—	—	—	229,415

* Wholesale price, plus 6d. distribution costs, minus 1s. paid by children.

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Nutritional Survey.—3,700 children in 20 schools were, by the end of May, included in this investigation. Four test centres are so far in operation, viz., Luton, Wolverhampton, Burton-on-Trent and Renfrew. Arrangements are being made with the London County Council for tests on newly-born infants to take place in two nurseries at Dulwich and Fulham, where the infants, to the number of 200 if possible, will be concentrated to facilitate supervision and recording.

Publicity and Propaganda.—Arrangements for a scheme under Section 11 of the Milk Act for increasing the demand for liquid milk, mainly by means of a press and poster advertising campaign during the summer months, were approved by the Ministry on June 3. The press campaign has already been launched.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted, by May 31, to £2,605,782. These payments were in respect of 1,090,651 animals, the average payment per beast being £2 7s. 8d. Since August 6, 1934, some 332,000 animals have been marked at ports (excluding Northern Ireland) under the Marking of Imported Cattle Order.

The Cattle Industry (Emergency Provisions) (Extension of Period) Order, 1935.—The Minister of Agriculture and Fisheries, the Secretary of State for Scotland and the Secretary of State for the Home Department, acting in conjunction, have made under the Cattle Industry (Emergency Provisions) Act, 1935, an Order dated June 13, 1935, prolonging until September 30, 1935, the period during which payments may be made by them out of the Cattle Fund. The payments authorized to be made during this further period will be, as in the previous period, in respect of steers, heifers or cow-heifers certified in accordance with arrangements made under the Cattle Industry (Emergency Provisions) Act, 1934, to conform with a standard prescribed by the Ministers' Regulations, and of the carcasses of such steers, heifers or cow-heifers, being animals or carcasses, as the case may be, which have been sold in the United Kingdom by producers during a period ending on September 30, 1935.

Under the Act of 1935, the Order requires confirmation by Resolution of each House of Parliament.

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Wheat Act, 1932: Sales of Home-Grown Wheat.—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1934, to June 7, 1935, cover sales of 32,785,493 cwt. of millable wheat, as compared with 26,658,183 cwt. in the corresponding period (to June 8) of the last cereal year.

Resignation of Member of Wheat Commission.—Sir Geoffrey L. Corbett, K.B.E., C.I.E., a member of the Wheat Commission representing the interests of consumers, has resigned on appointment as Economic Adviser to the Egyptian Government.

Wheat Deficiency Payments.—The third advance payment made by the Wheat Commission to registered growers on account of the current cereal year amounted to £1,130,052. The total of the three advances for the year amounts to £4,285,071.

Sugar - beet.—A memorandum on the Financial Resolution to provide the necessary authority for the continuance of the sugar-beet subsidy, subject to certain modifications, for a further period of twelve months after August 31, 1935, has been presented to Parliament. It is proposed that the rate of subsidy shall be 5s. per cwt. of white sugar related to a raw sugar price of 4s. 6d. per cwt. with appropriate adjustments if the average price of raw sugar should rise or fall below 4s. 6d. per cwt. It is proposed to discontinue the payment of any subsidy on molasses.

Proposed National Mark Schemes for Cheddar, Caerphilly and Cream Cheese.—The National Mark Cheese Trade Committee, at its meeting on June 4, 1935, approved draft National Mark schemes for home-produced Cheddar, Caerphilly and Cream cheese for introduction during the present year.

The proposed schemes provide for the following grades:—

			<i>Grade Designation</i>	<i>Minimum Age at Time of Grading</i>
Cheddar	..	..	(1) Extra Selected	3 months
			(2) Selected	6 weeks
Caerphilly	..	..	Selected	4 days
Cream	..	..	(1) Extra Selected	—
			(Double Cream)	
			(2) Selected	—

For Cheddar cheese, it is proposed that the grading shall be carried out on the authorized premises of the maker by

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a grader approved by the Ministry and remunerated from grading fees. The grader would be appointed by a Committee called the National Mark Cheddar Cheese Grading Committee, representative of the authorized manufacturers and makers.

For Caerphilly and Cream cheese, the grading will be the responsibility of the authorized maker, subject to supervision by the Ministry, and will be carried out only on the maker's premises authorized for the purpose.

Full particulars of the draft schemes are given in draft provisional Marketing Leaflets Nos. 80, *Caerphilly Cheese*, 81, *Cheddar Cheese*, and 83, *Cream Cheese*, copies of which may be obtained free of charge from the Ministry, 10, Whitehall Place, London, S.W.1.

The National Mark Trade Committee also approved a draft scheme and standard grades for Lancashire cheese, and draft standard grades for Derby, Leicester and Gloucester cheeses. The introduction of National Mark schemes for these cheeses is contingent on the industry being able to provide independent grading services. The Trade Committee recommended that an investigation should be made into the grading and marking of blue and white Wensleydale cheese.

The operation of National Mark schemes for cheese has emphasized the need for research into problems now being met with in connexion with the manufacture, distribution and marketing of home-produced cheese. The Trade Committee has set up a Sub-Committee to suggest the most useful lines along which such research could be carried out.

National Mark Scheme for Stilton Cheese.—Particulars of Stilton cheese graded under the National Mark Scheme for the quarter ended March 31, 1935 (compiled from returns rendered by authorized makers), are as follows:—

No. of makers grading cheese under the Scheme: 10.					No.	Weight.
						Cwt.
Total cheese graded	..	..	..	..	3,947	572½
(a) Blue Veined Extra Selected	..	..	..	..	395	55
(b) " " Selected	..	..	..	..	777	97½
(c) White	..	..	..	..	2,775	419½

National Mark Packers' Success at Table Poultry Show.—Authorized packers of National Mark dressed poultry were conspicuous amongst the prize winners at the London Table Poultry Show held at Smithfield Market on

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May 14. Out of 24 first, 17 second and 9 third prizes awarded, four National Mark packers between them gained no fewer than 7 first prizes, 1 second and 2 thirds; one of these packers carried off 4 premier awards, including one of the four special prizes offered by the Ministry for the best market packs of dressed table poultry which, in the opinion of the judges, complied with the statutory grades incorporated in the National Mark dressed poultry scheme.

This Show was the first annual show of its kind held under the auspices of the Table Poultry Producers' Association, the London Wholesale Poultry and Game Salesmen's Association and the Poultry Education Association.

Marketing Demonstrations.—*Bath and West Show, Taunton, 1935.*—The central portion of the Ministry's stand was devoted to a display of vegetables in season, graded and packed to National Mark standards (see accompanying illustration). This display clearly illustrated the advantages attending the marketing of vegetables in standard grades and packs, and attracted much attention, particularly from local retailers.

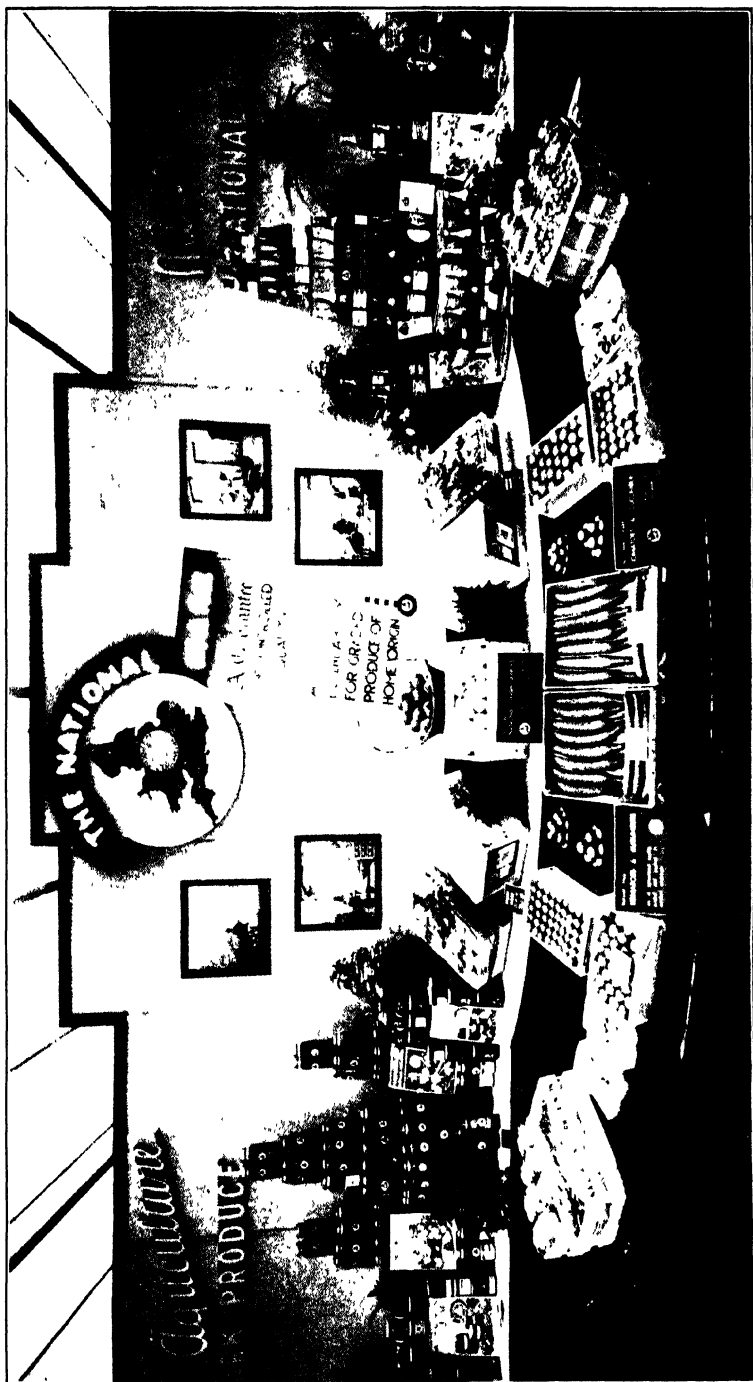
The exhibit also included demonstrations of the proposed grades for Cheddar cheese, which proved of great interest to factory Cheddar cheese makers, and of the new National Mark perry scheme.

Milk Crisis in France and Netherlands.* *France.*—A crisis in the French dairy industry has been impending for some time. The prices of dairy products have been steadily falling over a period but, until the end of last year, the fall in the wholesale price of milk was largely offset by a corresponding fall in the price of feeding stuffs. As milk and eggs were the only farm products bringing in an immediate return, farmers have been tempted to increase the supply. Much land which was formerly under the plough has been turned over to pasture, and the number of milch cows has increased by a million (over 12 per cent.) during the last eight years. According to the General Federation of Dairy Farmers, the output of milk in France has been increasing steadily since the War, as the following estimates show:—

Production and Utilization of Milk in France (In millions of gallons)

Year	Consumed as Milk	Utilized for Butter	Utilized for Cheese	Fed to Calves	Total Production
1913	906.8	930.2	344.9	635.7	2,817.6
1921	794.4	749.8	304.6	492.0	2,340.8
1925	861.3	946.5	392.2	616.9	2,816.9
1931	948.2	1,047.2	431.2	646.8	3,073.4
1932	968.0	1,062.6	440.0	664.6	3,135.2
1933	979.0	1,085.9	440.0	682.0	3,186.9
1934	979.0	1,177.0	440.0	689.2	3,285.2

* Note by the Market Supply Committee.



The Ministry's Stand at the Bath and West Show, Taunton 1935, with a display of vegetables in season, graded and packed to National Mark Standards

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In May, 1930, the milk producer got 70 to 80 centimes per litre, in May, 1934, he got 45 to 50, but in May, 1935, he got only 25 to 40, i.e., 3.7*d.* to 5.8*d.* per gal. A similar fall is shown in the price of manufacturing milk in the Paris region. In May, 1930, this fetched 77 centimes per litre, in May, 1934, 53 centimes, but in May, 1935, only 35 centimes per litre, or 5.1*d.* per gal. Retail prices have not fallen so much as wholesale prices. In the Paris area, producers' prices fell by 50 per cent. between May, 1930, and May, 1935, but retail prices fell by only 26.6 per cent. in the same period, although the present retail price is the lowest on record and lower than in most other countries. Typical prices in Paris are:—

			<i>Producers' price</i> <i>Per litre</i> <i>(centimes)</i>	<i>Retail price</i> <i>Per litre</i> <i>(centimes)</i>
May, 1930	..	..	77	150
May, 1935	..	..	35	110

With the object of meeting the crisis, the industry is asking the Government to institute a strict control of imports, particularly of Gruyere cheese, to undertake a campaign against fraudulent practices, to protect manufacturers against imitations of genuine dairy products, to insist on a higher fat-content and a higher level of quality and to encourage the export of the summer surplus of milk and dairy products. A certain amount has already been done to meet difficulties of the kind which have now become pressing. Regulations are in force fixing a standard fat-content for cheeses, prohibiting the manufacture of all imitation dairy products with the exception of margarine, and the sale of half-cream milk. These measures, however, are considered to be insufficient even as palliatives, and the late Government introduced a Bill into the Chamber at the end of February providing for a complete reorganization of the dairy industry. This Bill has passed the Chamber, and, in a modified form, has gone to the Senate. The Government has set up a Commission of Milk Producers and Manufacturers of Milk Products to consider the reorganization of the industry and has also appointed a Committee to study the development of exports.

Netherlands.—Difficulties, corresponding to those now becoming apparent in France, have engaged the attention of the Netherlands Government for the last three years. In view of the contraction of the home market and the loss of the principal export markets, it has been necessary to reduce the output of dairy products in the Netherlands and this has been done by drastic measures for reducing the numbers of livestock. At the same time, it has been necessary to subsidize milk production as a measure of relief to the farmers. The measures already taken, which include compulsory slaughter of dairy cattle on a large scale and the supply of cheap tinned meat for the poorer classes of the population, have not been enough. The older and less valuable animals have been killed off, but their places have been taken by the younger cows coming into milk and the amount of milk produced has been increasing rather than decreasing. The situation is now such that the output of milk must be reduced at all costs and, with this end in view, the scope of the milk subsidy is to be reduced so that only certain categories of milk will qualify for it.

The reduction is to be based on each producer's output in the last two calendar years. Any milk which is not sold or is not manufactured by the producer, is left out of account. Whenever possible, the reduction will be based on the total of milk fat produced. The average reduction for the whole country is to be 11 per cent., but scope is given for this percentage to be varied according to circumstances. The period during which the reduction will be applied covers the whole year, in order that the farmer may make arrangements suitable to the circumstances of his holding and that the seasons

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of both heavy and light production may be included. The amount of reduction varies from one district to another and need not be uniform for all farms in the same district. The manufacture of butter and cheese on the farm is to be prohibited in practically all cases so that the temptation to produce more milk than will qualify for the subsidy will be reduced as far as possible.

One area in the west of the country will be exempted from the new regulations. This is a long-established region of dairy farms which will be specially treated as the main source of liquid milk for the whole country.

From June 1, the price of manufacturing milk will be fixed at 2.96 cents per kilogram (about 4½d. a gal.), the fat-content being 3.2 per cent. This corresponds to a price of 77.70 cents per kilogram (11½d. per lb.) of butter and 92.5 cents per kilogram (about 1s. 1½d. per lb.) of milk fat. The rate of subsidy on the smaller amount of milk which qualifies for it will be raised and this will lead to an excess of expenditure over income on the part of the Agricultural Crisis Fund. The difference is to be covered by a special reserve derived from a levy on exports to certain countries in which quantitative regulation raises the returns received by the Dutch exporter.

Price Control in Germany.*—The following instances of price control in Germany are of interest.

Potatoes.—The principal Association of German Potato Merchants made an effort to stabilize the price of potatoes throughout the whole of the last season. Last autumn, a maximum price was fixed at a relatively high level with the object of preventing too large a proportion of supplies being used as fodder. In the winter, when it was necessary to protect consumers by fixing a minimum price, the existing price was maintained for this purpose. The minimum price remained throughout the winter and the usual seasonal rise of prices did not take place. To prevent any rise of price during the last few weeks of the season, the minimum price has now been declared a maximum. One effect of the stable price has been to reduce surplus storage from 60 per cent. to between 10 and 15 per cent above the pre-war level.

Beef.—Another example of price regulation comes from Bavaria where the Food Controller has fixed the maximum retail price for first-quality stall-fed beef at 80 pfennigs per ½ kilogram (about 1s. 2½d. per lb.). This price must not be exceeded except for "roast beef," fillet, and sirloin. Any retail prices lower than the maximum at the time when the Order comes into force must not be raised, but exemption can be made in certain cases. This is probably the first time since the War that the retail price of particular cuts has been fixed by authority in Germany.

Hitherto, cattle prices have been stabilized by the intervention of the Reich Office for Livestock in the market, but the fluctuations, seasonal and other, in the numbers of beasts coming forward rendered it almost impossible to keep prices at a level which would avoid the raising of meat prices to consumers. The feeding stuff situation, resulting from the drought of last summer and the restricted imports of concentrated feeding stuffs, led to excessive slaughterings during the winter. Cattle prices have been steadily rising during recent years and between March, 1934, and March, 1935, they went up by 27 to 28 per cent. Official statistics indicate that the retail price of beef in Bavarian cities in March, 1935, ranged from 75 to 80 pfennigs per ½ kilogram, which roughly corresponds with the prescribed maximum. This shows only a small increase over the price a year ago, but it is possible that actual prices may be greater than those officially recorded.

Bread.—The new German regulations regarding the weight and

* Note by the Market Supply Committee.

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marking of bread are also of interest. Price fluctuations in the grain market had led bakers to ask for official measures to stabilize the price of bread and to have the authorized weight of loaves changed to correspond with the agreed price. This practice, which concealed rises in the price of bread from the consumer, was ended in June, 1931 by the Law prescribing a fixed weight for the loaf of rye bread. This system of a fixed weight loaf will now be extended to cover all other kinds of bread. The weight is to be clearly marked on the loaf. In future, rye bread must weigh at least 750 grammes against 500 grammes as hitherto, or the total weight must be divisible by 250. Wheaten bread, which has hitherto not been regulated, must now weigh at least 500 grammes per loaf. Fancy bread sold in slices may only be supplied in quantities of 125, 250 or 500 grammes. This regulation is welcomed as putting an end to unfair competition.

REPORT ON AGRICULTURAL MARKETING SCHEMES

THE annual report to Parliament, for the year 1934, by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland, under Section 10 of the Agricultural Marketing Act, 1931, has been published by His Majesty's Stationery Office.* The report covers the operation of all marketing schemes in force during 1934 in England and Wales, Scotland or Great Britain, and also the procedure in connection with schemes submitted but not then in force. With the exception of the Aberdeen and District Milk Marketing Scheme, 1933, which came into force on the 29th March, 1934, all the schemes now in operation were approved before the end of 1933. No new schemes submitted in 1934 came into operation in that year, but various amendments of the Hops, Pigs, Bacon and Scottish Milk Marketing Schemes took effect under orders made by the appropriate Minister, after approval by Parliament where necessary. The report gives full particulars of the various amending Orders, with diaries of the principal dates in the progress of schemes and amendments.

The report for 1933 contained brief accounts of the initial periods of the schemes. The present report continues and supplements these accounts, and contains statistical data relating to the quantities of the "regulated products" dealt with, the prices of the products and the numbers of registered producers and contracts. Part I—Schemes in Operation—gives a description of the working of each scheme (except in so far as this was covered by the previous report) with an historical record of the operations of the board concerned, including trading operations (if any) and determinations made in the exercise of the boards' regulatory powers. The contract systems under the Pigs and Milk Marketing Schemes are described, and summaries are given of the results of the working of the systems in successive periods. Information is also given regarding complaints made against the operation of the schemes, and the proceedings of the Consumers' Com-

* Cmd. 4913. Price 1s. 6d. net (post free 1s. 8d.).

AGRICULTURAL MARKETING SCHEMES: REPORT

mittees and Committees of Investigations in connexion with such complaints, with a note of the action taken by the appropriate Minister. This Part of the report gives an interesting picture of the varied activities of the marketing boards, of the difficulties with which they have had to contend in the initial periods of working of the schemes, including the financing, with the help of loans from State funds, of their initial operations.

The magnitude of the boards' operations is indicated in the statistics given in the report. Some of the outstanding details are given below:—

Hops.—The acreage planted in 1932, when the Board took office, was 16,531. In 1933, it rose to 16,895, and, in 1934, to 18,037. The quantity of hops tendered to the Board by registered producers was 165,908 cwt. in 1932; 194,017 cwt. in 1933; and 245,496 cwt. in 1934.

The sums received from the Board for the sale of hops in 1932 and 1933 were £1,471,702 and £2,927,610 respectively, the average prices realized per cwt. being £8 17s. 2d. and £15 1s. 8d. The average price for the 1934 crop, under the trading agreement with the brewers, was £9 1s. 6d., plus 10s. levy.

Pigs and Bacon.—The expansion of operations under the Schemes is shown by the increases in the numbers of pigs contracted for in successive contract periods. The figures for Great Britain were:—

	<i>Contracts.</i>	<i>Pigs.</i>
November, 1933, to February, 1934	18,332	576,328
March to December, 1934	24,269	1,325,342
January to December, 1935	21,947	1,796,104

Milk.—158,706 producers were registered under the English Scheme and 9,420 under the three Scottish schemes at the end of the year. There were 69,160 producer-retailers under the English Scheme.

Milk sold on contracts in England and Wales for the first contract year ended September 30, 1934, was 716,248,568 gal., of which 523,630,238 gal. (73 per cent.) were sold for liquid consumption and 192,618,330 gal. (27 per cent.) for manufacture. Under the Scottish Milk Scheme, the total quantity of milk sold by registered producers during the year ended November 30, 1934, amounted to 106,379,073 gal., of which 87,694,544 gal., or 82.43 per cent., were sold to or through the agency of the Board. Milk used for manufacture accounted for 36.2 per cent. of total sales.

In the first three months of the "Milk-in-Schools" Scheme, over 2½ million children in England and Wales consumed nearly 6,000,000 gal. of milk. Over 400,000 children will participate in the Scheme in Scotland during 1935.

Potatoes.—Registered producers, and their aggregate potato acreage at the end of 1934, amounted to:—

	<i>Number.</i>	<i>Potato Acreage.</i>
England and Wales	52,708	427,300
Scotland	14,719	115,600
	67,427	542,900

AGRICULTURAL MARKETING SCHEMES: REPORT

Part II describes proceedings in connexion with five schemes which have been submitted, but have not yet been approved.

Appendixes to the report give, in addition to a chronological outline of the progress of each scheme up to the date on which it came fully into operation, particulars of all loans made to marketing boards from the Agricultural Marketing Funds, and also the accounts and balance sheets of each board.

JULY ON THE FARM

E. J. ROBERTS, M.A., M.Sc.,
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Creeping Thistles.—About this time of the year, the Creeping Thistle is often conspicuous in pastures. It is only in recent years that the real difficulty of control has been generally realized; the prevalence of the thistle used to be ascribed to the farmers' neglect to cut before seeding, and one often heard the old rhyme:—

“ Cut them in May, they'll grow in a day,
Cut them in June, they'll grow very soon,
Cut them in July, die they may,
But cut them in August, die they must.”

Some authorities wishing to err on the safe side used with confidence to recommend cutting twice a year for two or three years, and others emphasized that, if the mowing machine were used to ensure low cutting, eradication would be hastened. On some experimental farms, where it was assumed that control by cutting was possible, trials were laid down to discover the most suitable times for cutting. The most important fact that has been learned from numerous attempts at eradication by cutting is that in land constantly and closely grazed the Creeping Thistle cannot be controlled by this method to any appreciable extent. At the College Farm, Aber, where in the interests of tidiness the thistles on the cow pastures have been cut with a mowing machine twice a year for over ten years, the amount of this weed has decreased but very little.

The Creeping Thistle spreads by means of “ seeds,” but mainly by powerful underground stems, the latter method being responsible for the difficulty of eradication. Unlike the seeds of the Spear Thistle, a large proportion of the “ seeds ” of the common thistle are infertile. In trials carried out at this College, an average germination of 12 per cent. was obtained from samples totalling about 1,000 “ seeds.” Even a low germination percentage, however,

JULY ON THE FARM

may prove a serious matter when large numbers of "seed" are carried by the wind. While cutting may be useless as a means of eradication, it has the merit of protecting from fresh infestation land from which this weed has been eliminated by other means, and the running of the mowing machine over unevenly grazed pasture is always of value.

The most effective method of controlling the Creeping Thistle is to put up a field for hay for a year or two now and again. Many ascribe the efficacy of this method to the fact that the thistles are carried off in the hay, thus making sure that the "seeds" do not mature and fall on the ground after cutting. This view cannot be correct, since cutting in pasture at a time which definitely prevents seeding fails to eradicate the weed. In observations carried out from here, and reported in this JOURNAL (June, 1932), a note was made of the difference in the habit of growth of thistles growing in closely grazed pasture and in hay. In the former, the leaves extended down to the ground, while in hay the lowest live leaf on the thistle stem was at an average height of $8\frac{1}{2}$ in. from the ground. Thus, when the thistles in the hay and in the pasture were cut at a height from the ground equal to that of the blade of a mower, the thistle stumps in the hay land had no leaves remaining, while those in the pasture had from 1 to 3. It is possible that the success of putting up a field for hay as a means of eradicating the Creeping Thistle may be partly, if not wholly, due to the fact that no leaves are left on the thistle stump after the hay is cut. It is doubtful, however, if this is the whole explanation; thus, to quote from a Herefordshire correspondent, writing to oppose this explanation, "we now cut thistles below the ground with a spud at least once, and if possible twice, a year, but I am sorry to say that we have been able to do no more than just keep the weed in hand."

It is probable that the different habit of growth of the thistle when growing in hay, producing a longer stem, less crowded with leaves, and growing in the partial shade of the hay, may result in a weakened underground system because of a lower rate of carbon assimilation. It is likely that this weed may have to be controlled, not by a direct attack on it when it grows under conditions that are ideal for it, i.e., in a closely grazed pasture, but by tackling it when it grows in hay or in long grass. The latter condition would obtain when producing grass silage; for this

JULY ON THE FARM

purpose the grass could be grazed bare until the middle or the end of May, because the creeping thistle does not develop much above ground before that time. Another method of indirect attack is suggested by the work of M. G. Jones, at Jealott's Hill, where it was observed that this weed made only small headway in plots where perennial rye-grass predominated. The investigator attributed this effect of the rye-grass to its early growth in spring, causing it to be well away before the thistle made any appearance, thus not giving it much chance to establish its sub-aerial part. Where the rye-grass had been weakened by heavy winter and early spring grazing, it was not so effective.

Pastures.—Where grass sheep are kept, the stocking of the grass land gets considerably lighter this month, owing to the disposal of the lambs. Among the advantages attached to the production of milk-fed lamb, not the least is the fact that, except where early lambs are produced, the food requirements of the flock follows roughly the productivity of the grass land. By the time the grass land is at the height of its production, in May or June, the lambs are well grown, and eat a considerable amount of grass. When the spring flush of grass has passed, the sale of lambs accelerates, and, by the middle of August all excepting the culls will have been sold.

An experiment in progress at the farm attached to this College shows the effect of the inclusion of wild white clover, when seeding down, on the stock-carrying capacity of a pasture, and on the live-weight increases obtained from it. It also shows the large head of stock that a suitably managed pasture can maintain in a thriving condition. Two 4-acre pastures laid down in 1927 have been compared for the last five grazing seasons, the two fields differing only in that, when seeded down, wild white clover was included in one and omitted from the other. The only manure applied to these pastures since seeding down was a light dressing of farmyard manure put on in the winter of 1928-29, between the crops of hay taken in the first two years. The experiment has begun each year about May 9, both pastures having been grazed bare by mountain ewes until the end of April and then left free of stock for not more than a fortnight until the beginning of the trial. The number of stock put on the plots has been decided by the amount of grass; the wild white clover plot has always carried more stock than the other. Thus, the number of

JULY ON THE FARM

stock put on the plots at the beginning of the experimental season has been as follows:—

STOCK PER ACRE.

<i>Wild White Plot.</i>		<i>Plot without Wild White.</i>	
5	Welsh Mountain ewes	4	Welsh Mountain ewes
5	" " lambs	4	" " lambs
1	Yearling heifer	1	Yearling heifer

This stock remains on the plots until the middle of July, when the lambs are sold fat, and the ewes removed to another pasture. The cattle are usually left on the plots until the end of the experimental period, i.e., the end of October. Early in August, mountain wether lambs are put on the plots, 5-6 to the acre on the wild white plot, and 4-5 on the other. Taking an average of the 5 grazing seasons, 1930-34, the field in which wild white clover was included when seeding down has given 25 per cent. more live weight increase than that from which it was omitted; this superiority is mostly due to the greater stock-carrying capacity of the former. The great advantage of including the wild white clover was evident in spite of the fact that the trial was carried out on land favouring the growth of indigenous clover; thus, in 1934, 7 years after seeding down, the pasture in which no white clover was sown contained 12 per cent. of this ingredient. It might be asked whether the indigenous white clover is likely to increase to such an extent as to equal in quantity that in the plot where it was sown; it can be replied that, 7 years after seeding down, the superiority of the wild white clover plot was as pronounced as ever, both in regard to production and botanical composition.

Sugar-beet.—Where crops are affected by Heart Rot, the disease can generally be detected this month. It usually occurs in patches in the field, and the central or heart leaves of affected plants will be found to discolour, blacken, and finally die. If the attack is very severe, the root may become involved; but, generally, attacks in this country are mild and secondary leaves appear later. An account of this disease will be found in the Ministry's recently-published Bulletin No. 93, *Pests and Diseases of the Sugar-Beet*, pp. 35 *et seq.*, and another account of it was given in the *Jealott's Hill Research Bulletin* for April (Vol. IV, No. 4). The disease is not very prevalent in England, but caused considerable damage in the Irish Free State last year, and

JULY ON THE FARM

has prevented the growing of beet on land otherwise suited to it. It has been found on the Continent of Europe that the disease is due to boron deficiency, and that it can be prevented by adding borax to the soil at the rate of about 10 lb. per acre. This has been confirmed in the Irish Free State. In the absence of sufficient knowledge of the effect of borax on land that is not in need of it, the opinion expressed in the Bulletin is in favour of not applying the borax until the disease appears, as it is difficult to forecast whether a field will need it. This disease affects both mangolds and sugar-beet, but it is more serious in the latter; the root itself becomes affected and a large proportion of it has to be cut away.

Wool.—Although the majority of lowland farmers complete their shearing in June, many hill farmers have still to tackle this work. Low prices cause many owners of grass-land flocks to feel doubtful about the desirability of washing sheep, particularly where facilities are poor; with arable sheep washing is essential because of the amount of dirt carried in the fleece. For mountain flocks the practice varies. Thus it is customary to wash Cheviots, but not Blackfaces. Again, in the same district and with the same breed of hill sheep, some owners never fail to wash, while others do not. The price per lb. received for the wool is not the only consideration. In the case of mountain flocks, the delay between washing and shearing, necessary for drying, is inconvenient because of having to retain the sheep on the limited area of enclosed land; the labour of collecting the flock from the open mountain prevents most owners from putting the sheep there in the interval between washing and shearing.

The advisability of washing sheep has been the subject of investigations with mountain sheep by Prof. R. G. White and T. Lewis (*Welsh Journal of Agriculture*, Vol. VII), and with Kent sheep by N. L. Tinley (*Journal of the Ministry of Agriculture*, May, 1931). In the Welsh experiment, it was arranged that 19 farmers should each set aside 40 mountain ewes at washing time, washing 20 and leaving 20 unwashed. The fleeces from the two lots were weighed and sent off to Bradford for examination under an arrangement with the City of Bradford Conditioning House. The total weight of the washed wool was 915 lb. against 1,033 lb. of the unwashed, i.e., approximately the proportion of 10:11.

JULY ON THE FARM

Thus, to make up only for the loss of weight in washing under those conditions, those producers on the average should have received 10 per cent. more for the washed wool than for the unwashed wool. The tests at Bradford indicated that the average value of the two lots of wool to the manufacturers was also roughly in the proportion of 10:11, though the different lots varied considerably. These experiments indicated an important difference between sheep grazing hill land and those grazing the lowlands as regards loss in weight on washing. The former gave only a small loss, and it is probable that on many mountain farms this will not exceed 5 or 6 per cent.; in such instances a small increase in price for washed wool would make the operation worth while. On many farms of the lowland type, the loss was about 20 per cent.; this suggests that if unwashed wool from such farms is worth 8*d.* a lb., washed wool should make at least 10*d.*

It is interesting to note that the unwashed wool contained more moisture than the washed fleece; the authors suggest that this is due to the grease of the wool absorbing and retaining more moisture than the wool substance itself. Contrary to expectations, there was no connection between the shortness of the interval between washing and shearing, and the loss in weight on washing.

In the investigations with Kent sheep, estimates from figures supplied by Messrs. The Kent Woolgrowers Ltd., relating to over 300,000 fleeces, indicated an average loss in weight due to washing of 12.1 per cent. in ewe fleeces and 17 per cent. in teg fleeces. There was about 2½*d.* per lb. difference in price between washed and greasy fleeces; it was estimated that a woolgrower producing 1,000 lb. of greasy ewe wool per annum, the produce of about 128 ewes, would have increased his gross returns by £8 9*s.* 10*d.* in 5 years if his sheep had been washed. From this, the cost of washing has to be deducted; the investigator left his readers to decide whether washing was worth while.

Bracken Eradication.—Referring to the note under this heading in the June issue of this JOURNAL (page 283), the price of sodium chlorate was, by a typographical error, given as 25*s.* per cwt. The actual price is 35*s.* per cwt., and readers are kindly requested to note this correction.

NOTES ON FEEDING

W. B. MERCER, M.C., B.Sc. (Principal), and Colleagues,
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Forward Buying.—The low prices of foodstuffs at mid-summer, 1934, induced many people to resume the practice of forward buying. This was a common practice amongst dairy farmers and beef feeders before the War, though it then often involved storage on the farm. In certain districts bran used to be bought in large quantities and stored in layers of 6 in. or thereabouts interleaved with similar layers of chaffed straw—for bran is difficult to store for long in any quantity. Nowadays it is generally possible to arrange contracts on the basis of delivery to order and payment on delivery.

In June, 1934, good bargains were to be had in Indian meal, millers' offals and barley meal. An examination of the price charts for six typical foodstuffs—bran, barley meal, weatings, flaked maize, ground-nut cake and palm kernel—during recent years does not, however, suggest that there has been any general tendency for an autumn rise. Over longish periods all foodstuff prices tend to conform to the same curve, but over periods of a few months they move independently of one another.

The following table, calculated from the Ministry's Weekly Marketing Reports, compares June quotations with the averages for the months July-December during the past 5 years:—

		<i>Bran</i>			<i>Barley Meal</i>			<i>Weatings (or Thirds)</i>			<i>Flaked Maize</i>			<i>Decor. Ground-nut Cake</i>			<i>Palm Kernel Cake</i>		
		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1930	June ...	5	10	0	6	15	9	5	8	0	8	3	9	7	18	9	5	18	9
	July-Dec.	6	9	2	6	2	10	5	16	4	7	10	10	7	16	0	5	8	8
	(average)																		
1931	June ...	5	7	6	6	9	6	5	12	0	6	5	0	7	10	0	6	1	3
	July-Dec.	6	7	6	6	18	0	6	3	0	6	5	8	7	12	4	5	19	3
	(average)																		
1932	June ...	6	12	6	7	7	0	7	0	3	6	7	9	7	19	6	6	10	0
	July-Dec.	6	17	6	7	3	10	6	13	0	6	14	2	8	4	6	6	1	4
	(average)																		
1933	June ...	4	14	3	6	0	0	5	2	0	5	13	10	7	0	0	6	0	0
	July-Dec.	5	13	4	6	0	2	5	7	4	5	14	10	6	16	2	5	18	0
	(average)																		
1934	June ...	5	5	0	6	0	5	5	8	0	5	18	5	6	0	0	5	17	6
	July-Dec.	6	17	4	7	9	5	6	16	2	6	17	8	6	13	0	6	3	6
	(average)																		

NOTES ON FEEDING

These prices are, of course, all ex-mill. Actual prices on the farm depend in part on transport charges and agents' commissions.

Apart from possible savings under these heads, success in forward buying clearly depends on "spotting the winner"; the chances of success are much greater with some foods than with others.

Barley meal is subject to rather large fluctuations owing to seasonal yield variations. Theoretically it should be possible to foretell rises and falls with some accuracy, merely by following the marketing or trade journal reports on crop prospects abroad.

Bran, maize products, and, to a lesser extent, weatings appear to offer the best odds. On the evidence of the past 5 years, indeed, it is 4 to 1 on weatings rising during the autumn months.

At the time of writing, conditions seems sufficiently stable to warrant the mild gamble implied in forward buying, and we, at Reaseheath, have accordingly adopted this measure with certain foods for the coming autumn. Lest, however, we should be accused of leading others astray, we refrain from saying which we have bought, and we hasten to add that if everyone accepted the evidence at its face value and "acted accordin" the odds would change very quickly.

Jarovization.—Botanists in Odessa are making history. Lyssenko and a group of co-workers are opening up a new field in plant physiology by their studies on the forces governing the life histories of plants. They have devised a method of seed treatment that promotes early ripening of the crop. To describe the process it has been necessary to coin (from the Russian word for spring) a new term *Jarovizacii*. In the first English accounts of Lyssenko's work this word was Anglicized to Jarovization. Now we understand, "Vernalization" is to be substituted. With every respect to philologists we prefer the transliteration as a perpetual memory of the debt we owe to Russia. In days gone by we somehow managed to cope with Przemyzyl; surely we can now manage Jarovization.

Everyone is familiar with the fact that plants pass through different phases of life. The phases overlap a little, and are therefore not quite so distinct as the ages which begin with the mewling infant and end "sans taste,

NOTES ON FEEDING

sans everything''; but in a cereal there is no difficulty in distinguishing between such phases as germination, tillering, vegetative growth and seed formation. In certain of these stages visible growth is going on, in other stages there is no apparent increase in substance, merely a change in the form or condition of the plant. The life history seems to consist of a series of bounds rather than in continuous growth. No one knows very much of the forces governing the succession of stages and regulating the clock. Presumably they are of the nature of hormones. Be they what they may, they are evidently released by changes in external conditions.

Flowering in most British plants under natural conditions is manifestly associated with fine weather. The vegetative stage of the plant, during which visible growth is most active, can be extended or reduced by variations in external conditions. The most important stages from the agriculturist's standpoint are perhaps the vegetative stage and the reproductive stage.

Since external conditions can release the forces that lead to flowering while the plant is still in the early stages of vegetative growth, Lyssenko argued that external conditions could conceivably release those forces if they were brought to bear on the plant *before* it had reached the vegetative stage—possibly indeed before the plantlet had emerged from the germinating seed. If this were possible, seeds might be so treated as to ensure early flowering of the resultant plants. Lyssenko and his co-workers then proceeded to demonstrate that by appropriate treatment of the seed the life cycle of *T. durum* could be speeded up considerably. The most efficacious treatment was found to consist in partially germinating the grain, then holding it for a number of days at a temperature just above freezing point. By means of such treatment, it has become practicable to use in Arctic regions varieties of wheat that, under normal treatment, would not come to fruition at all. The life histories of other plants, it is found, can be speeded up or otherwise modified by analogous methods, and plants as dissimilar as millet and soya beans have already been made to respond.

The work is as yet too new to have influenced practice outside Russia, and tentative trials in this country, Australia and America have not been very encouraging.

NOTES ON FEEDING

In England wheat is not a particularly attractive subject; since we already possess some of the highest yielding strains in existence, nothing would be gained by the employment of shorter-lived varieties. The possibilities of exploiting the underlying ideas in connexion with the production of flowers, vegetables and glasshouse plants are, however, almost limitless.

Nitrogen on Pastures.—*The Economic Return.*—The new system of grassland management, involving rotational grazing and the liberal use of nitrogenous manures has in its early years been more fortunate than many agricultural discoveries. It has survived the ordeal of numerous experiments, and if few farmers have adopted the Warmbold plan in its entirety, its principles have become absorbed into the common stock of agricultural lore.

The main interest at first was naturally the return obtainable from nitrogenous manures liberally used. The survey of the Development Commission's Pasture Sub-Committee showed that this return varied within exceptionally wide limits; on small plots scattered throughout the country they obtained, in one year, increases ranging from 2 per cent. to 427 per cent. While no other trials with which we are familiar have yielded results so markedly discordant, practically every investigator who has subsequently reported has stressed the seasonal variation to be expected.

From a survey of current literature it is gathered that the yield of English lowland pastures ranges as a rule from about 5 tons of green grass per acre up to 10 or 12 tons, while the bulk of the investigations so far carried out show that increases of the order of 25 per cent. are usually obtainable from 2 or 3 cwt. per acre of a rapidly acting nitrogenous manure. Increases of a much higher order have been reported; on the other hand in a two-year trial at Cambridge, the increase amounted to only 10 per cent.

While it cannot be contended, therefore, that any farmer anywhere can use nitrogen on his pastures in the certainty of obtaining an economic return, the odds in his favour are very much higher than in most forms of farming investment. A 25 per cent. increase in even a 5 ton grass crop from the use of 2 cwt. of sulphate of ammonia means at least 3 cwt. of starch equivalent for 15s. The chances of obtaining larger returns for the same expenditure are very considerable.

The economic possibilities of intensive manuring having

NOTES ON FEEDING

been established, interest now centres in the many problems of management arising therefrom. Much has been written on the value of early grass. A statement of the food costs per gallon of milk in a dairy herd before and after turning out to April grass reveals a striking contrast. There can be no question of the cheapness of forced grass compared with winter keep.

Buffer Value.—A succession of dry seasons has drawn our attention rather forcibly to a virtue in the early bite hitherto overlooked, namely, its value as a protector of the unmanured area. A dry season is apt to punish the pastures on a heavily stocked farm. It results in over-close grazing, with consequent damage to the grasses—especially rye-grass. Dry winters, allowing stock to graze throughout, operate in the same way.

One of the biggest difficulties the stock farmer has had to face in recent seasons has been that of letting the pasture grow to a reasonable length before it was grazed off. It is always tempting to turn cattle out as soon as the weather is warm enough, irrespective of the amount of grass available. An area of forced grass which will provide for the cattle until there is a good bite on the remainder of the pastures is an enormous asset. In addition to its intrinsic worth, the early bite has a definite buffer value.

Oats for Poultry.—Science has so far failed to find any justification for the belief, generally held by poultry keepers, that finely ground oats are more digestible than whole or coarsely ground oats. *A priori*, the practical man's argument that a finely ground grain will, in the short time it remains in the bird's body, yield more sustenance than the same grain in larger pieces seems sound; and the fact that the pioneers in poultry fattening in Sussex went the length of making special millstones to grind an intractable grain to powder may also be regarded as evidence—of a sort. Against these considerations must be set the solid fact that in carefully designed digestion trials, Halnan, in 1931, failed to find any significant difference in digestibility between two samples of the same bulk, one of which was finely ground; while Crowther has demonstrated that barley meal can satisfactorily replace Sussex ground oats in the rations of fattening ducks.

Many farmers, faced with the difficulty of selling their oats, look to poultry as an outlet for them. Under such circumstances there is much to be said for the *via media*.

NOTES ON FEEDING

On one farm with which the writers are familiar, safety is sought by rough grinding of the oats followed by winnowing through a machine adjusted to separate the bulk of the husks from the meal. The mealier portion is then fed to poultry, while the husks go to the cattle. Time was when the best was reserved for the cattle. *Sic transit !*

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	5 16
Maize	78	7.6	4 10
Decorticated ground-nut cake	73	41.3	6 15
„ cottonseed cake	68	34.7	7 0

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1.4 shillings, and per unit protein equivalent, 1.29 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

FARM VALUES.

Crop	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	5 13
Oats	60	7.6	4 14
Barley	71	6.2	5 7
Potatoes	18	0.8	1 6
Swedes	7	0.7	0 11
Mangolds	7	0.4	0 10
Beans	66	19.7	5 18
Good meadow hay	37	4.6	2 18
Good oat straw	20	0.9	1 9
Good clover hay	38	7.0	3 2
Vetch and oat silage	13	1.6	1 0
Barley straw	23	0.7	1 13
Wheat straw	13	0.1	0 18
Bean straw	23	1.7	1 14

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu-rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro-tein equiv.
Wheat, British	£ s. 5 15	£ s. 0 8	£ s. 5 7	72	s. d. 1 6	d. 0.80	% 9.6
Barley, British feeding	5 15	0 7	5 8	71	1 6	0.80	6.2
" Canadian, No. 3 Western ..	6 5	0 7	5 18	71	1 8	0.89	6.2
" Argentine	5 13*	0 7	5 6	71	1 6	0.80	6.2
" Danubian	5 13*	0 7	5 6	71	1 6	0.80	6.2
" Persian	5 13	0 7	5 6	71	1 6	0.80	6.2
" Polish	5 17	0 7	5 10	71	1 7	0.85	6.2
Oats, English, white	7 17	0 8	7 9	60	2 6	1.34	7.6
" " black and grey	7 13	0 8	7 5	60	2 5	1.29	7.6
" Scotch, white	8 7	0 8	7 19	60	2 8	1.43	7.6
" Canadian, No. 2 Western ..	8 3	0 8	7 15	60	2 7	1.38	7.6
" " No. 3 "	7 8†	0 8	7 0	60	2 4	1.25	7.6
" " mixed feed	7 2	0 8	6 14	60	2 3	1.21	7.6
" Chilian	7 10‡	0 8	7 2	60	2 4	1.25	7.6
Maize, Argentine	4 10	0 6	4 4	78	1 1	0.58	7.6
" South African, No. 2 White Flat	4 17†	0 6	4 11	78	1 2	0.62	7.6
Beans, English, winter	6 5‡	0 16	5 9	66	1 8	0.89	19.7
Peas, Japanese	12 17†	0 14	12 3	69	3 6	1.87	18.1
Dari	6 10†	0 7	6 3	74	1 8	0.89	7.2
Milling offals—Bran, British ..	5 2	0 14	4 8	43	2 1	1.12	9.9
" " broad	5 12	0 14	4 18	43	2 3	1.21	10
Middlings, fine, imported ..	5 17	0 12	5 5	69	1 6	0.80	12.1
Weatings, ...	5 17	0 13	5 4	56	1 10	0.98	10.7
" Superfine, ...	6 10	0 12	5 18	69	1 9	0.94	12.1
Pollards, imported	5 5	0 13	4 12	50	1 10	0.98	11
Meal, barley	7 7	0 7	7 0	71	2 0	1.07	6.2
" " grade II	6 12	0 7	6 5	71	1 9	0.94	6.2
" maize	5 5	0 6	4 19	78	1 3	0.67	7.6
" " South African	5 2	0 6	4 16	78	1 3	0.67	7.6
" " germ	5 7	0 10	4 17	79	1 3	0.67	8.5
" locust bean	7 10	0 5	7 5	71	2 1	1.12	3.6
" bean	8 5	0 16	7 9	66	2 3	1.21	19.7
" fish, white	13 15	2 0	11 15	59	4 0	2.14	53
Maize, cooked, flaked	6 0	0 6	5 14	84	1 4	0.71	9.2
" gluten feed	5 12	0 12	5 0	76	1 4	0.71	19.2
Linseed cake, English, 12% oil ..	8 5	0 19	7 6	74	2 0	1.07	24.6
" " " 9% "	7 17	0 19	6 18	74	1 10	0.98	24.6
" " " 8% "	7 12	0 19	6 13	74	1 10	0.98	24.6
" " " 6% "	8 0‡	0 19	7 1	74	1 11	1.03	24.6
Soya-bean cake, 5½% oil	7 17‡	1 6	6 11	69	1 11	1.03	36.9
Cottonseed cake—English, Egyptian seed, 4½% oil ..	4 12	0 16	3 16	42	1 10	0.98	17.3
" " Egyptian, 4½% " ..	4 1	0 16	3 5	42	1 7	0.85	17.3
" " decorticated, 7% " ..	7 0†	1 6	5 14	68	1 8	0.89	34.7
" meal, decorticated, 7% " ..	7 0†	1 6	5 14	68	1 8	0.89	34.7
Coconut cake, 6% oil	6 5	0 16	5 9	77	1 5	0.76	16.4
Ground-nut cake, 6.7% oil ..	6 0*	0 17	5 3	57	1 10	0.98	27.3
" " " decor., 6.7% oil ..	7 0	1 6	5 14	73	1 7	0.85	41.3
" " " imported, decorticated, 6.7% oil ..	6 10	1 6	5 4	73	1 5	0.76	41.3
Palm-kernel cake, 4½-5½% oil ..	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " " meal, 4½% oil ..	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " " meal, 1.2% oil	5 12	0 11	5 1	71	1 5	0.76	16.5

(Continued on page 406)

PRICES OF FEEDING STUFFS (Continued)

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Feeding treacle	5 0	0 7	4 13	51	1 10	0.98	2.7
Brewers' grains, dried ale ..	4 17	0 10	4 7	48	1 10	0.98	12.5
" " " porter ..	4 10	0 10	4 0	48	1 8	0.89	12.5
Dried sugar-beet pulp (a) ..	5 15	0 5	5 10	66	1 8	0.89	5.2

(a) Carriage paid in 5 ton lots. * At Bristol. ‡ At Hull. † At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of May, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.19d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N., 7s. 6d.; P₂O₅, 2s. 1d.; K₂O, 2s. 11d.

MISCELLANEOUS NOTES

Meat Production and Trade

A REPORT* summarizing the most up-to-date information available relating to the production and marketing of meat in the principal countries of the world has just been issued by the Imperial Economic Committee. The publication is of special significance at the present moment when the live stock and meat industries occupy such a prominent place in Imperial affairs.

The international aspects of the meat trade are examined in an interesting introduction. It is concluded that world beef production declined between 1925 and 1931, with a slight recovery in more recent years; whereas mutton, lamb and pigmeat production have undoubtedly expanded during the same period. These trends are reflected in consumers' preference, a pronounced changeover from beef to mutton and lamb being apparent in most countries.

The different classes of live stock and their meat derivatives are dealt with separately. Within each group, live stock populations, meat production, and supplies and prices on the United Kingdom market are analysed in

* Meat: A Summary of Figures of Production and Trade. Imperial Economic Committee Report. His Majesty's Stationery Office. Price 1s. net, post free 1s. 2d.

MISCELLANEOUS NOTES

detail, whilst *per capita* consumption in the principal countries of the world reveals important trends. Throughout, the numerous tables differentiate between Empire and foreign countries, thereby facilitating comparison.

The importance of the United Kingdom as the principal importing country, and the tendency to take an expanding share of the world's meat exports is shown. Besides being the dominant factor in the world's trade in pigmeat, the United Kingdom, in 1933, accounted for 84 per cent. of the beef and veal imports into the principal importing countries and over 95 per cent. of mutton and lamb imports in recent years. The increase, as a result of the Ottawa policy, in the Empire's contribution to United Kingdom meat supplies is significant. Thus the Empire's share in United Kingdom beef imports increased from 10 per cent. between 1926 and 1930 to nearly 25 per cent. in 1934, whilst mutton and lamb from the overseas Empire accounted for 80 per cent. of imports in 1934 compared with 60 per cent. in 1928. The proportion of home-produced meats on the United Kingdom market has increased only slightly in recent years.

Beef prices withstood the world economic depression longer than other classes of meat, but a continual fall has been in evidence since 1931. Mutton and lamb prices fell by a considerably greater extent between 1930 and 1932, but they recovered appreciably subsequently. Supply regulation also brought about a very substantial increase in the prices of pigmeat in the world's principal market.

The report analyses the importance of meat and live stock exports in the trade of the principal exporting countries and contains appendixes showing the measures taken in various countries to combat depression by means of duties and supply regulation.

Sainfoin

Now that the public is including more lamb and mutton in its dietary, sheep, which have yielded more consistent returns than other farm stock during the last dozen years, are likely to remain profitable in the immediate future. Over the same period the weakness of the market for barley, the time-honoured concomitant of the flock in an arable system of sheep husbandry, has induced widespread and sometimes sweeping alterations in practice, more especially in the distinctively sheep areas of the east and

MISCELLANEOUS NOTES

south of England, alterations not unaccompanied by their own peculiar dangers. Still, the stock market can call the tune independently of corn, and the present is not untimely either for improving new ways of management or for remembering the old.

The Ministry has lately, through some of its district officers, revised its information regarding Sainfoin. Changes have been recognized that, briefly, have consisted more in contraction of total area than in the adoption of new methods of cultivation or utilization. Incidentally, Sainfoin seems to be losing favour as an ingredient of seeds mixtures for temporary leys.

It seems desirable, therefore, to recapitulate the advantages to the farmer, particularly of the South, of a crop that for one reason or another has recently fallen in popular favour. It is a useful alternative to clover on clover-sick land. As a drought-resister it is second only to lucerne, than which it is better adapted for grazing. When ordinary hay is practically unsaleable, Sainfoin hay will invariably command a good price. Whether as hay or as green forage, Sainfoin is an admirable food for all fattening and breeding stock, and is regarded as the best possible change for stock that may not be thriving on ordinary pastures. As a "pick-me-up" for lambs too long on stale autumn grass, Sainfoin is unsurpassed.

An Advisory Leaflet, No. 249, on this valuable crop has just been published by the Ministry. Copies may be obtained free on application.

Soil Sterilization

SOIL Sterilization is no longer regarded by growers of glasshouse produce as an expensive luxury, but rather as a form of insurance, and as part of the year's normal routine. The experiments of Sir John Russell and his colleagues in this country demonstrated the benefits to be obtained from soil sterilization, and served to stimulate some of the more progressive amongst growers of glasshouse crops to carry out their own experiments from a practical standpoint.

The efficiency of steaming has never been questioned; but, in the early days, it was so expensive that only the largest growers would undertake it. Nowadays, the process of sterilization by steam is so widely practised that it is not surprising that methods that once seemed completely

MISCELLANEOUS NOTES

satisfactory are being superseded by others that are even more efficient and easier to work.

With the older methods of trays, grids and spikes, it was not always easy to apply the heat to every portion of the soil, owing to obstructions in the form of concrete foundations, holding stay irons, and "dollies" for posts and pipes. Consequently, it was not unusual to find in the houses many small areas where diseases persisted, and from which they spread rapidly to adjacent areas.

A new method, the "Hoddesdon" pipe system, devised by Mr. J. Harnett, of Hoddesdon, largely overcomes these difficulties because it employs pipes laid in position separately, and then joined together prior to turning on the steam. It is a considerable improvement upon anything that has been used hitherto. A full and illustrated account of this system forms the distinguishing feature of the third edition of the Ministry's Bulletin No. 22, *Practical Soil Sterilization*,* which has just been published.

Ordnance Survey

THE Minister has appointed a Committee, under the chairmanship of the Rt. Hon. Sir John Davidson, G.C.V.O., C.H., C.B., M.P., Chancellor of the Duchy of Lancaster, to report upon the Ordnance Survey. The other members of the Committee are Brigadier D. F. Anderson, C.M.G., D.S.O. (War Office), Mr. C. B. Collins (Air Ministry), Mr. R. N. Duke, D.S.O., M.C. (Scottish Office), Mr. H. W. S. Francis, O.B.E. (Ministry of Health), Mr. H. G. Richardson (Ministry of Agriculture and Fisheries), Mr. W. R. L. Trickett, O.B.E. (H.M. Treasury).

The terms of reference are as follows:—

(a) to consider what measures are necessary to accelerate the revision of the Ordnance Survey maps in order to bring them up-to-date and thereafter to maintain them at a high level of accuracy, while providing for such other public services as are undertaken by the Ordnance Survey Department;

(b) to consider what immediate steps are possible in the meantime to revise Ordnance Survey maps to the extent necessary for the purpose of town and country planning schemes;

(c) to review the scales and styles of Ordnance Survey maps placed on sale to the public and to recommend whether any changes are desirable; and

(d) to review the conditions upon which the reproduction of Ordnance Survey maps is permitted.

The Secretaries of the Committee are Mr. C. F. Colbeck and Lieutenant M. O. Collins, R.E. Communications

* Obtainable through any bookseller, or direct from H.M. Stationery Office, Adelphi House, Kingsway, London, W.C.2, price 1s., post free 1s. 1d.

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should be addressed to the Joint Secretaries, Ordnance Survey Committee, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

The Agricultural Index Number

THE general index number of prices of agricultural produce for May was 111 (corresponding month of 1911-13 = 100), which is a reduction of 8 points on the April figure and 1 point below May, 1934. (If allowance is made for payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act, the May index would be 117.) Prices changed appreciably during the month, but in most cases they followed the seasonal trends, while in a few instances, e.g., fat cattle, milk and potatoes, they were of considerable extent. A rise of about 1s. 4d. per live cwt. occurred in the average for second quality fat cattle, the increase being continuous throughout the month. Potatoes also showed an upward trend, with a more pronounced rise towards the close of May. In the case of milk the drop in the regional contract price to summer level was delayed until May, instead of occurring as usual in April, with the result that the May index was much lower. The reduced index for milk accounts entirely for the fall of 8 points in the general index.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1930.	1931.	1932.	1933.	1934.	1935.
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	—
July	134	121	106	101	114	—
August	135	121	105	105	119	—
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

Grain.—The May average of wheat prices at 5s. 4d. per cwt. was 6d. higher than in the previous month and the index rose 3 points to 67. (If the "deficiency payment" under the Wheat Act, 1932, is allowed for, the index would be 114.) Barley showed a decline of 2d. per cwt. to an average of 7s., and the index fell 2 points to 91, while oats, although 3d. dearer at 7s. 2d. per cwt., were 1 point lower

MISCELLANEOUS NOTES

with an index of 97 owing to a proportionately greater rise in price in May, 1911-13. In May, 1934, wheat averaged 4s. 8d., barley 7s. 6d. and oats 6s. per cwt.

Live Stock.—The price of fat cattle rose continuously throughout May, and the increase of 1s. 4d. per live cwt. in the average for second quality was rather more than usual, with the result that the index appreciated from 86 to 89. (The effect of adding the payment of 5s. per live cwt. would be to raise the May index to 102). Fat sheep showed a seasonal fall in price in the month under review, and as the fall was about normal the index was only 1 point lower at 140. Seasonal declines were observed also in fat pig prices, baconers being 6d. and porkers 10d. per score cheaper, and the indices were 4 and 7 points lower, respectively, at 104 and 106. Dairy cattle, store sheep and store pigs were cheaper than in April, and in each case the index was lower, but store cattle appreciated by about 12s. per head and the index rose from 85 to 90.

Dairy and Poultry Produce.—It was noted in reviewing the April indices that the index for milk was abnormally high on account of the fact that the regional contract prices were retained at winter level. The fall of 4d. per gallon which occurred in regional prices in May has, however, brought the index back to normal levels, and it was 162 for the month under review or the same as in May, 1934. Butter was about 1½d. per lb. cheaper than in April, and the index declined by 2 points to 87, as against 85 a year ago. Cheese was 3 points higher than a month ago at 94 as compared with 123 last year. There was a seasonal rise of 1d. per dozen for eggs, the index moving up by 3 points to 99, or 10 points above May, 1934. Fowls and ducks were both slightly cheaper than in April and also than a year ago.

Other Commodities.—Prices of both clover and meadow hay depreciated a little in May, but the change was a trifle less than in the base period, so that the combined index was 1 point higher at 100. Values for old crop potatoes showed a decided upward trend early in May, and after the severe frost in the third week of the month the prospect of an extended season for the shortening supplies caused a very sharp rise. Over the month as a whole prices at the large markets were about 15s. 6d. per ton higher than in April, and the index rose by 18 points to 113, as against an index of 90 in May, 1934. No change was observed in the price or index for wool.

MISCELLANEOUS NOTES

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity	1933	1934	1935			
	May	May	Feb.	Mar.	April	May
Wheat	71	59	63	62	64	67
Barley	85	98	101	95	93	91
Oats	76	81	99	96	98	97
Fat cattle... ..	97	95	91	88	86	89
" sheep... ..	120	150	134	139	141	140
Bacon pigs	107	117	120	114	108	104
Pork	107	120	125	120	113	106
Dairy cows	101	100	102	101	99	98
Store cattle	99	88	84	86	85	90
" sheep	84	103	109	113	107	105
" pigs	112	134	142	130	122	115
Eggs	92	89	96	94	96	99
Poultry	132	129	124	124	116	125
Milk	138	162	171	161	215	162
Butter	85	85	86	88	89	87
Cheese	115	123	94	91	91	94
Potatoes	97	90	116	108	95	113
Hay	68	83	102	103	99	100
Wool	62	89	87	83	83	83

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	124	120	121	121	119	114
Fat Cattle... ..	—	—	105	102	100	102
General Index	105	116	122	119	126	117

Foot-and-Mouth-Disease. Two outbreaks of Foot-and-Mouth disease were confirmed on June 20, 1935, in Rochdale, Lancashire. The usual restrictions on the movement of animals out of and within an area of approximately 15 miles of the infected premises were imposed by the Ministry.

Farm Workers Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1, on Monday, May 27, 1935, the Rt. Hon. the Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Cumberland and Westmorland.—An Order varying the existing minimum and overtime rates of wages as from June 8, 1935, the rates as varied to continue in operation until May 30, 1936. The minimum rates are in the case of male workers of 21 years of age and over hired by the month or longer period 39s. (instead of 38s.

MISCELLANEOUS NOTES

as at present) per week of customary hours, which is defined as consisting of 62 hours; in the case of other whole-time male workers of similar ages 31s. (instead of 30s. as at present) per week of 48 hours in winter and 32s. 6d. (instead of 31s. 6d. as at present) per week of 54 hours in summer, with payment for overtime unchanged at 8½d. per hour for all male workers; and in the case of casual male workers of 18 years of age and over the minimum rate remains unchanged at 8d. per hour. For all female workers of 18 years of age and over the minimum rate remains unchanged at 5½d. per hour for all time worked.

Hampshire and Isle of Wight.—An Order fixing special differential rates of wages for overtime employment of male workers on the corn harvest in 1935, the rate in the case of workers of 21 years of age and over being 9d. per hour.

Hertfordshire.—An Order fixing special overtime rates of wages for employment during the hay harvest of 1935, to apply to all employment on harvest work after 5.30 p.m. (legal summer time) on each day of the week; the overtime rate in the case of male workers of 21 years of age and over is 10d. per hour, and in the case of female workers of 19 years of age and over 7½d. per hour.

Lincolnshire (Kesteven and Lindsey).—An Order fixing special differential rates of wages for overtime employment of male workers on the corn harvest in 1935, the rate in the case of workers of 21 years of age and over being 1s. per hour.

Suffolk.—An Order cancelling the existing minimum and overtime rates of wages for male workers and fixing fresh rates in substitution therefor to come into force on June 9, 1935, and to continue in operation until March 31, 1936. The minimum rates for male workers of 21 years of age and over are 31s. (instead of 30s. as at present) per week of 50 hours in summer and 48 hours in winter, except in the week in which Christmas Day falls when the hours are 39½, with in addition in the case of horsemen, cowmen and shepherds of 18 years of age and over a sum of 6s. per week to cover employment up to 10 hours per week in connexion with the immediate care of animals. The overtime rate for all male workers of 21 years of age and over is 9d. per hour (as at present).

Yorkshire (East Riding).—An Order cancelling the existing minimum and overtime rates of wages and fixing fresh rates in substitution therefor to come into force on June 9, 1935, and to continue in operation until November 23, 1935. The minimum rates in the case of male workers are (a) for workers engaged by the year and living in the rate is unchanged at £81 12s. per year for foremen; £76 10s. per year for beastmen and shepherds and £71 8s. per year for waggoners, with lesser rates for lads and beginners, the hours in respect of which these rates are to be payable being 52½ in any week in summer except in the week in which Good Friday falls, when the hours are 43, and 48 in any week in winter except in the week in which Christmas Day falls, when the hours are 39½, with in addition not more than 12 hours per week on weekdays and 3 hours on Sundays spent on the care of and attention to stock, and (b) for all other workers of 21 years of age and over 33s. 6d. per week of 52½ hours in summer (up to October 26, 1935), and 48 hours in winter (remainder of the period) with, in addition in the case of workers living in, not more than 12 hours per week on weekdays and 3 hours on Sundays spent on the care of and attention to stock. The overtime rates for male workers of 21 years of age and over are unchanged at 10d. per hour on weekdays and 1s. per hour on Sundays. The minimum rates for female workers of 16 years of age and over remain unchanged at 6d. per hour with overtime at 9d. per hour.

Anglesey and Caernarvon.—An Order fixing a special minimum rates of wages for male workers of 18 years of age and over

APPOINTMENTS

engaged specially for work in connection with the hay and corn harvests of 1935. The rate for male workers of 21 years of age and over is 7s. per day.

Enforcement of Minimum Rates of Wages.—During the month ending June 14, 1935, legal proceedings were taken against four employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow.

Committee Area.	Court.	Fines imposed.	Costs allowed.	Arrears of wages ordered.	No. of workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Devon	Tavistock ^c	—	—	—	3
Glamorgan ...	Llantrisant	2 0 0	—	20 0 0	1
Cheshire	Congleton	5 5 0	1 4 0	7 12 4	1
Cardiff	Llansawel†	—	0 4 0	26 4 8	1
		£ 7 5 0	1 8 0	53 17 0	6

* Cases of two workers dismissed and that of the third worker adjourned.

† Dismissed under Probation of Offenders Act.

Some Wireless Talks to Farmers in July

Date; July	Station	Time	Speaker	Subject
1, 8, 15, } 22, 11	National	10.45 a.m.	Mr. A. G. Street	Country People
	West	6.30 p.m.	Mr. A. W. Ling and Col. J. Creagh- Scott	Signs of the Times in Farming
17	"	8.45 p.m.	Various	Yeoman Humour : Stories in West- country Dialects
24	"	6.30 p.m.	Not settled	Talk from the Royal Welsh Show
4	Scottish	8.0 p.m.	Mr. A. D. Buchanan Smith	Scottish Entrants in the Royal Show
12, 26	"	6.50 p.m.	Mr. W. G. R. Pater- son	For Scottish Far- mers in particular
18	"	8.0 p.m.	Mr. John Anderson	Bee-keeping

APPOINTMENTS

County Agricultural Education Staffs

ENGLAND

Gloucestershire—Mr. G. E. Burkitt, N.D.P., has been appointed County Poultry Instructor, *vice* Mr. E. A. King.

Hampshire—Mr. L. Hook has been appointed Assistant County Poultry Instructor, *vice* Mr. G. E. Burkitt, N.D.P.

Miss F. J. Atkinson, N.D.D., has been appointed Temporary Assistant Dairy Instructor.

PRICES OF ARTIFICIAL MANURES

Staffordshire.—Mr. H. R. C. Kennedy, N.D.P., has been appointed Assistant Poultry Lecturer and Adviser, *vice* Mr. L. J. Shelley.

Warwickshire.—Mr. W. J. Constable, B.Sc., has been appointed Assistant Agricultural Organizer, *vice* Mr. J. E. Bull, N.D.A.

WALES

Denbighshire.—Miss E. M. Lloyd, N.D.D., Assistant Dairy Instructor, has resigned.

Monmouthshire.—Mr. Keith Wilson, N.D.P., County Poultry Adviser, has resigned.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended June 12				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.
Nitrate of soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	7 5d	7 5d	7 5d	7 5d	7 0
Calcium cyanamide (N. 20.6%)	7 5s	7 5s	7 5s	7 5s	7 0
Kainit (Pot. 14%) ..	3 0	2 14	2 12	2 14g	3 10
Potash salts (Pot. 30%) ..	4 11	4 6	4 4	4 6g	2 10
" " (Pot. 20%) ..	3 12	3 6	3 3	3 6g	3 4
Muriate of potash (Pot. 50%)	7 4	6 16	6 12	6 16g	2 9
Sulphate " " (Pot. 48%)	8 3	7 18	7 12	7 18g	3 3
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%)	2 19	..	2 19f	2 16k	3 6
" " (S.P.A. 13½%)	2 15	2 11	2 15f	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	..	6 17	6 15f	6 7	..
Steamed bone-flour (N. 4%, P.A. 27½-29½%) ..	5 12	5 12	5 10f	5 10	..

Abbreviations ; N. = Nitrogen ; P.A. = Phosphoric Acid ; S.P.A. = Soluble Phosphoric Acid ; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater ; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails ; southern rails 2s. 6d. extra.

h Prices shown are f.o.r. northern rails ; southern rails, 1s. 3d. extra.

NOTICES OF BOOKS

Flour Quality: Its Nature and Control. By E. A. Fisher, M.A., D.Sc. Pp. 58. (London: National Joint Industrial Council for the Flour Milling Industry, 52, Grosvenor Gardens, S.W.1. Price 6d.)

Students of milling and baking will find much useful information in this pamphlet. The characteristics of good baking flour are dealt with in considerable detail. The problems associated with colour, gas production, and gluten quality are explained in straightforward language so that the novice can grasp the principles involved. The various methods of improving flour, both chemically and physically, are set forth in concise form. This is a very useful reference book for millers, bakers and students.

The Physick Garden: Medicinal Plants and Their History: By E. G. Wheelwright. Pp. 288 and 18 figs. (London: Jonathan Cape. 1935. Price 10s. 6d..)

This is an historical survey of the use of plants by man in the treatment of disease, tracing the progress of knowledge from the earliest records in ancient civilizations and of primitive man to the Greeks, mediæval monastic orders and herbalists to the modern medical profession. It also reviews, under the botanists' natural orders, the plants used both for official drugs and as "simples." An interesting chapter describes the position of drug supplies at the present day and the work carried out in Great Britain during the Great War under the influence of the Ministry. It is clearly seen that the price-factor, in the absence of legislation, over-rules the high quality of drug plants cultivated at home in contrast to wild plants collected abroad. Although the author's enthusiasm has led her to include some irrelevant facts, the matter will have a peculiar fascination for many people, and is presented in an interesting and readable manner.

A Handbook of Narcissus. By E. A. Bowles, F.L.S., F.R.E.S., V.M.H. Pp. 248, and 25 figs. (London: Martin Hopkinson, Ltd. 1934. Price 12s. 6d.)

This is a scholarly book for amateur gardeners with an enthusiasm for narcissi, recording the life-long experience of the author with these flowers, both as an active gardener and as Chairman of the Narcissus and Tulip Committee of the Royal Horticultural Society. Few people can approach the versatility of the author, who shows himself to be a fancier, in the best sense of the word, of narcissi in their highest development as show flowers, a botanist and collector of wild species, a student of their history, a capable gardener, and an artist of no mean ability. Viewed from so many angles this discussion of narcissi is full of interest, and although some may wish that the copious references to the lore of early writers might be partially relegated to footnotes and bibliographical references, many will be interested to learn the history of their narcissus-friends.

Errors are few, but in a work that is styled a handbook, mention of all the chief varieties might be expected; yet Emperor does not appear among the trumpets, nor Forerunner, the earliest of the new trumpet daffodils, nor Hospodar, the now widely-grown *Incomparabilis* variety. The author's appreciation of the newer and scarcer kinds of narcissi should stimulate many gardeners to make new purchases, and to follow the excellent advice for displaying them to the best advantage in their gardens, on the show bench, and as cut flowers in the house.

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Hampshire Implement and Machinery Demonstration

AN extensive implement and machinery demonstration, arranged under the auspices of the Hampshire Agricultural Education Committee, by their Agricultural Organizer (Mr. L. G. Troup) and his staff, was held on June 25-26. Part of the display was given at the County Farm Institute, Spars-holt, and part, by kind permission of Mr. G. W. S. Beale, at Chilbolton Down Farm. The exhibits at the Farm Institute covered a wide range, and included hay-making and grass-silage equipment; implements designed for row-crop work; transplanters; horticultural tractors and spray-ing machines; dairy, poultry and outdoor pig-keeping appliances; and a comprehensive display of electrical kitchen equipment. At Chilbolton Down Farm, tractor-drawn ploughs, cultivation implements and rotary tillers were at work, while other machines were engaged in bush and tree pulling.

The Farm Institute Section.—Of immediate interest, at the Farm Institute, was the hay-making machinery; both power-driven and trailing mowers, hauled by different types of wheeled tractors, worked well in a very heavy crop. Two methods of collection were to be seen: with one, the hay was collected by sweeps attached to motor cars and delivered to a stacker; in the other, it was lifted on to a wagon by a hay loader and thence delivered to a stacking elevator.

The grass-silage equipment consisted of a "Cutlift" combine attached to a trailing mower, the combine collect-ing the young grass from the cutter bar and delivering it to a pneumatic-tyred wagon towed behind it. The wagon, when full, was hauled to the silage pit.

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In the row-crop equipment plant, two different makes of tractors, with close-coupled potato ridgers, gave a good performance. A transplanting machine showed that the setting of marrow stem kale plants was well within its capabilities. Two spacing drills were shown, one of which had previously been used for sowing part of the crop, so that visitors could see the efficiency of the work done with it. Seven small horticultural tractors, included in the demonstration, were employed both in ploughing and cultivation; subsequently some of them, fitted with appropriate tools, were used for sugar-beet hoeing. The adaptability of these small machines should make them attractive to smallholders. A representative collection of small spraying machines was shown at work in the Farm Institute orchard. Although not capable of the high pressures and large delivery demanded on many extensive orchards to-day, these machines are able to satisfy the demands of the small fruit grower seeking a sprayer at a moderate price.

In dairy equipment, two competitive classes were instituted for sterilizers—Class A for outfits with capacity of less than 30 cub. ft., and Class B for outfits of 30 cub. ft. or over. The outfits were tested over a period of three days, during which weather conditions varied slightly. It is probable that higher standards of efficiency would have been obtained had the outfits been operated in a closed building of the normal type; but the results obtained, in all instances, were strictly comparable. Most of the outfits were operated by the representatives of the respective entrants; and for those designed to burn solid fuel, steam coal, of a quality usually employed on a farm, was used throughout the tests. In judging, the cost of the apparatus, construction, fuel consumption, and suitability for dairy purposes, were the factors taken into consideration. The following awards were made:—

Class A.

- Silver Medal: "Desco." Dairy Supply Co., Ltd., Cumberland Avenue, Park Royal, N.W.10.
- Bronze Medal: "Cleena-Milk." Clean Milk Equipment (Southern), Ltd., 53a, Crown Street, Reading.
- Certificates: "D.O.C." Dairy Outfit Co., Ltd., 253-255, Pentonville Road, N.1.
- "Dairials." Dairials, Northgate House, Jewry Street, Winchester.
- "Hosier." Hosier Inventions, Ltd., Wexcombe House, Marlborough, Wilts.
- "Wessex." Wessex Supplies, Ltd., Wells, Somerset.

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"Lainchbury." Lainchbury & Son, Kingham, Oxford.

Class B.

Silver Medal: "Desco." Dairy Supply Co., Ltd., Cumberland Avenue, Park Royal, N.W.10.

Bronze Medal: "Wessex." Wessex Supplies, Ltd., Wells, Somerset.

Certificates: "Gascoigne." Gascoignes (Reading), Ltd., 114-118, Castle Street, Reading.

"Aylesbury." E. T. Lowton & Co., Haddenham, Bucks.

"Cleena-Milk." Clean Milk Equipment (Southern), Ltd., 53a, Crown Street, Reading.

"Hosier." Hosier Inventions, Ltd., Wexcombe House, Marlborough, Wilts.

"Lainchbury." Lainchbury & Son, Kingham, Oxford.

Other interesting exhibits in dairy equipment were six milking machine units, shown working in the cowshed, and two outdoor milking plants; a milk carton filling and sealing machine; and large and small models of aluminium bottle-capping machines.

In poultry equipment, there was a competitive class for mobile houses. The conditions called for a house, suitable for 50 or more birds on free range, mounted on wheels or skids, and capable of being moved by one horse. Either solid or slatted floors were permitted. The entries were judged, previous to the demonstration, on a score card which took account of suitability of design, soundness of material and construction, mobility, and price (cost per bird). The awards were:—

Silver Medal: House—T. W. & F. W. Lemon, West Stour, Gillingham, Dorset.

Bronze Medal: Slatted Floor House—Tom M. Scotney, West End Mills, St. Ives, Hunts.

Certificates: Slatted Floor House—Enham Industries, Andover, Hants.

Semi-slatted Floor House (9 ft. $\times$ 6 ft.)—C. A. Sydenham Hannaford, Hamworthy Junction, Dorset.

"All-weather" Slatted Floor and Scratching Shed House—D. McMaster & Co., Mount Bures Works, Bures, Essex.

House—Kennet Manufacturing Co., Ltd., Highcliffe Works, Winchester.

Other exhibits in poultry equipment included fold unit houses, egg-washing machines, and a plucking machine.

For fold unit pig houses and portable pig houses, there were also competitive classes, the entries being judged, before the opening day, on a score card that took into consideration price, soundness of construction, mobility, and

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general suitability. The following awards were made:—

Silver Medal: "S.10" Pig Hut—English Bros., Ltd., Wisbech, Cambs.

Bronze Medal: Pig Hut—Smith Bros., Albion Street, Cheltenham, Glos.

Certificate: Pig Hut—C. A. Sydenham Hannaford, Hamworthy Junction, Dorset.

Another exhibit, in connexion with pigs, that attracted considerable interest was a tethering equipment for sows.

Chilbolton Down Farm Section.—The land chosen at this farm for demonstration purposes was rough downland turf, of a somewhat spongy nature, containing large flints. About a dozen tractors of different makes and types were shown ploughing and cultivating. It was possible to note the capabilities of well-known models with steel wheels and spade lugs, some similar models fitted with pneumatic tyres, and a variety of track-laying or crawler machines. The smallest tractors were hauling two-furrow ploughs, and the largest pulled a couple of four-furrow ploughs with ease. The work of two rotary cultivators exhibited provided an interesting contrast with that of conventional ploughed land worked down to a tilth under rigid tine or disc harrows. Grassland harrows of several types were also shown. Of the tractors adapted for uprooting bushes and small trees, one worked by direct haulage; the other three by means of winch gear attached to the tractors.

Farm Institute Live Stock Judging Competition

THE ninth annual Live Stock Judging Competition, open to teams of three from Farm Institutes in England and Wales, was held at the farm of Colonel A. F. Nicholson, Highfield Hall, near Leek, Staffordshire, on Friday, June 7, 1935. Teams from the following counties competed:—Cheshire (Reaseheath), Cumberland and Westmorland (Newton Rigg), Hertfordshire (Oaklands), Monmouthshire (Usk), Northamptonshire (Moulton), and Staffordshire (Rodbaston).

Unsettled weather prevented a large attendance of visitors, but on the whole the event must be classed as a distinct success. The standard attained by the competitors was very high, particularly when giving reasons for the order in which they had placed the cattle in the different classes.

The team from Northamptonshire proved to be the winners with a score of 274 marks out of a possible 365.

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The Cheshire team were runners-up 16 points behind.

The teams were required to judge Ayrshire cows for dairy purposes, Shire horses, large White Pigs for bacon, Oxford Down Cross sheep for the butcher, and Rhode Island Red poultry. The following judges officiated:—

Dairy Cows	..	Col. A. F. Nicholson.
Horses	.. ..	Mr. Morris Belcher.
Sheep	.. ..	Mr. A. Heath.
Pigs	.. ..	Mr. R. P. Haynes.
Poultry	.. ..	Mr. E. L. Pattison.

Very good stock was provided for judging, and visitors were subsequently given an opportunity to inspect Colonel Nicholson's noted Ayrshire cattle and Shire horses. Mr. J. H. Wain also invited the students to see his farm and stock nearby.

The luncheon was presided over by Sir Joseph Lamb, M.P., and the perpetual Challenge Cup provided by the National Farmers' Union was presented by Mr. J. H. Wain, President of the Union.

It was a departure to hold the competition so far north, and this fact resulted in entries being received from northern counties, but several southern counties were unable to participate.

Carnegie United Kingdom Trust

THE Twenty-first Annual Report of the Carnegie United Kingdom Trust,* recently published, announces that it is not proposed to finance fresh rural community councils or playing field developments, but that new allocations for village halls will probably be made during the next quinquennial period.

The trustees are directing their attention to the possibility of devising a satisfactory land settlement scheme. Last year they appointed Mr. A. W. Menzies Kitchin, M.A., B.Sc., of the staff of the School of Agriculture, Cambridge, to prepare a comprehensive report on the entire problem of small holdings (whole or part-time) on the scale of from 3 to 10 acres and on the co-operative principle.

During the year a sum of £6,540 was promised in grants for 43 village halls, bringing the total number of grant-aided halls to 259, and the sum of the grants to £37,000. In the Shetlands no fewer than nine halls have been approved for

* *The Carnegie United Kingdom Trust: 21st Annual Report, 1934.* Pp. vi+88. Obtainable from The Secretary, Carnegie United Kingdom Trust, Comely Park House, Dunfermline, Fife.

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grant-aid since 1930, three being in the island of Yell, almost the most northerly territory in the British Isles.

In seven counties new or increased grants have been allocated to rural community councils, some twelve of which have been actively engaged in providing occupation and relief for unemployed men. The work has included the convening of conferences, advisory services to occupational centres in the smaller towns and large villages, and the organization of summer camps.

Grants of £2,700, £1,000 and £300 have been allocated respectively for the period 1936-38 to three national associations which are concerned with rural preservation.

An interesting development has been the inauguration of a national scheme of "Countryside Wardens," based on a successful experiment in co-operation with the Derbyshire Rural Community Council. The purpose of the scheme is "to inculcate in the public a proper sense of responsibility and courtesy, not only to the property-owner but to other users of the countryside." The scheme has the cordial support of the National Farmers' Union, the Central Landowners' Association and the Land Agents' Society. These principles are being impressed on schoolchildren by posters, the distribution of badges and the publication of a "manual of æsthetic geography."

The trustees have decided to make a further grant of £500 per annum for the three years 1935-37 to the experiment in co-operative rural marketing promoted by the National Federation of Women's Institutes. The markets concerned numbered 69 by September, 1934, and showed a total turnover of £27,563, of which £25,517 had been paid to producers. Already there is a marked improvement in the quality and appearance of the produce, owing partly to instruction given in local schools arranged by various county councils.

The Origin of the Thrashing Machine

FOR some three centuries attempts have been made to simplify the heavy labour involved in separating the grain from the ear, but the flail survived until well into the 19th century, and is still, indeed, used in some parts of Europe to-day. As early as 1636, however, a patent was taken out for a thrashing machine designed to expedite the work and reduce the amount of labour required. Unfortunately, no details of this machine have survived, but it was

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obviously unsuccessful because it was not adopted. The history from this point has been traced in an article contributed to a recent issue of *The Lincolnshire Magazine* by Sir William Tritton, a member of the Ministry's Agricultural Machinery Testing Committee, in which he indicates the lines along which the machine has been evolved from the elementary design invented by Michael Menzies in 1732, enlightening us as to much that was formerly obscure.

On one point he would seem to have fallen into error. A renewed search of the works of Jethro Tull has failed to disclose any support for the statement that he attempted to invent a thrashing machine. Tull's interests were in seed drills and hoes for cultivating between rows of widely spaced wheat in order to secure a heavy crop without the use of manures. Apart from this, however, students of the history of farm engineering will be grateful to Sir William for his investigation.

Importation of Narcissus Bulbs into the U.S.A.

UNTIL after December 15, 1936, no further special permits will be granted for the entry for any purpose into the United States of America of the Golden Spur, Emperor, Victoria, Glory of Sassenheim and Spring Glory varieties of narcissi. After the above date, they will be admitted under permit, without limitation as to quantity or use, from countries which maintain inspection. This intimation is the purport of a notice, dated June 4, 1935, received by the Board of Trade from the United States Department of Agriculture (Bureau of Entomology and Plant Quarantine), and recorded in the *Board of Trade Journal* for June 27, 1935.

The Jones-Bateman Cup for Research in Fruit-growing

THE Royal Horticultural Society is offering for award this year the valuable cup presented to it, in 1920, by Miss L. Jones-Bateman, of Abergele, to be used for the encouragement of fruit production. The Cup, which is a silver-gilt replica of the Warwick Vase, is offered triennially by the Society for researches in the growing of hardy fruits, grapes and peaches in the open or under glass.

Candidates for this award are required to submit, by October 31, 1935, accounts of the work they have done in the direction mentioned; and such work must have been carried out in the United Kingdom, mainly during the past five years. The applications will be considered by three assessors, two appointed by the Royal Horticultural Society

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and one by the National Farmers' Union; and they will report to the Council of the Royal Horticultural Society upon the originality and comparative potential value to the fruit-growing industry of the work of the respective candidates.

A successful candidate holds the Cup for three years, giving a bond for its safe return; and, on relinquishing it at the end of that period, he will receive a commemorative gold medal. A holder of the Cup is eligible to compete for the next or any subsequent award. All communications respecting the award should be addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.1.

Agricultural Economics Society's Essay Competition

THE Agricultural Economics Society has decided to offer two annual prizes of £10 and £5 respectively for essays on subjects connected with the economics of agriculture. Competitors must be either students at recognized institutions or holders (of not more than two years standing) of degrees and/or diplomas in agriculture and/or economics. Essays for the current year must be sent in by June 30, 1936, and must be on one of the following subjects:—

- (a) The influences of machinery on systems of agricultural production in Great Britain *either* (a) 1870-1913 or (b) 1914-1935.
- (b) Rationalization of British agriculture and the system of Land Tenure.
- (c) Influences of British International loans on imports of foodstuffs and agricultural production in Great Britain.
- (d) Influences of consumers' demands on agricultural production.
- (e) Trends of production in British agriculture.

Further particulars of the conditions can be obtained from the Honorary Secretary, the Agricultural Economics Society, University of Reading, 7, Redlands Road, Reading.

Agricultural Machinery Testing Committee

THE undermentioned Certificate and Report, issued by the Ministry have been published in pamphlet form (price 2d., post free 2½d.):—

No. 57. Gloucester O.K. Sterilizer.

The test was conducted at the National Institute for Research in Dairying, Shinfield, near Reading.

Copies of the pamphlet may be obtained, at the price stated, through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

SOME ASPECTS OF LIQUID MILK CONSUMPTION

S. M. MAKINGS, N.D.A.,
Midland Agricultural College.

It is recognized that liquid milk consumption in this country is comparatively low. In 1927, Forrester estimated that the general daily average for the country was just under one-third of a pint *per capita*, and he gave a list of 14 countries only one of which (Germany) appeared to have a lower consumption than England and Wales.* The net result of recent inquiries indicates very little improvement, and it seems likely that average daily *per capita* consumption in this country is still barely more than one-third of a pint.

Milk is a commodity highly rated by dietists and nutrition experts; it has been the subject of widespread propaganda, and ignorance of its food value has generally disappeared. It might be supposed that a comparatively high standard of living, with a greater variety of foods available to the consumer, is a factor tending to low milk consumption, but the available evidence indicates that consumption is lowest among the lower-income classes. According to the estimates of the Milk Marketing Board nearly 30 per cent. of the liquid milk annually produced for sale is classed as surplus to liquid requirements and is disposed of for manufacturing purposes, bringing an average net return of less than 6*d.* per gallon. Under such conditions the factors governing the low average consumption are of first importance, and an inquiry conducted by the Economics Department of the Midland Agricultural College throws some light upon these factors.

During the second quarter of 1934 data with reference to the amounts and classes of milk consumed were collected from 600 families in Nottingham, representing a total of 2,225 persons. Table I shows the average rate of consumption by consumers classified into three main groups.

* *The Fluid Milk Market in England and Wales.* Economic Series of Reports, No. 16, Ministry of Agriculture and Fisheries.

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**TABLE I.—LIQUID MILK CONSUMPTION BY PERSONS
CLASSED IN OCCUPATIONAL GROUPS**

(Quantities in pints per head per week)

<i>Groups.</i>					<i>Milk consumed.</i>
Middle class	..	..	..	..	4.1
Good working class	..	..	..	..	3.1
Poor working class	..	..	..	..	2.3
General Average	..	..	..	..	3.3

The effect of income limit on liquid milk consumption appears to be well marked. A decrease in average consumption of almost 45 per cent. from the highest to the lowest income group indicates that purchasing power is a vital factor affecting rate of consumption. The general average of 3.3 pints per head weekly is probably higher than the average for the country, since, at the time of the inquiry, Nottingham was not suffering as severely from the depression as were many other centres.

From a dietetic standpoint it is generally assumed that families with children have a greater milk requirement than families without children. The evidence from Nottingham indicates, however, that the childless families were the heavier consumers of liquid milk per head.

**TABLE II.—COMPARISON OF AMOUNTS OF LIQUID MILK
CONSUMED BY FAMILIES WITH, AND FAMILIES WITH-
OUT CHILDREN**

(Quantities in pints per head per week)

<i>Groups.</i>				<i>Milk consumed by</i>
				<i>Childless Families. Families with</i>
				<i>Children.</i>
Middle class	..	..	4.6	3.8
Good working class	..	..	3.5	2.9
Poor working class	..	..	3.4	2.1

The milk supplies of families with infants (children under 5 years) were augmented to some extent by baby foods, but this augmentation appears inadequate in respect of the lower income groups.

**TABLE III.—WEEKLY EXPENDITURE ON BABY FOODS*
OTHER THAN LIQUID MILK**

<i>Groups.</i>					<i>Expenditure</i>
					<i>per Infant.</i>
					<i>(pence)</i>
Middle class	..	..	..	..	2.6
Good working class	..	..	..	..	1.8
Poor working class	..	..	..	..	0.5

It would seem that with the additional expense of rearing children among the working classes the pressure of

* Includes only those preparations sold as baby foods or under a trade name that allowed them to be classed in that category.

SOME ASPECTS OF LIQUID MILK CONSUMPTION

economy prevents a rational increase in the amount of liquid milk taken. Although it is likely that the adults of families with children consume less milk *per capita* than childless adults, yet it would appear that liquid milk consumption by children in these classes is relatively low. This both reflects the low effective demand of the working classes and suggests that liquid milk is regarded as a comparatively expensive food commodity.

Examination of the effect of size of family on milk consumption showed that in all classes expenditure per head on total milk (including milk substitutes) had a definite tendency to decline as families grew larger, so that the average family of seven persons spent less than two-thirds of the amount per head on milk than did the average family of two persons. Three factors are likely to have contributed to this reduction:—

1. Although milk is a commodity that lends itself to complete utilization, it may be assumed that waste does occur and that this would tend to be less in the larger families.

2. Where the smallest unit of purchase is the half-pint this amount would be greater than the daily *per capita* consumption in those households practising strict economy, so that there would be a tendency to restrict consumption to the unit of purchase when a further increment of purchase would appear to be more than was necessary to meet the demands of an addition to the family.

3. Attempted economy by the larger families in the lower-income groups led to the greater use of milk substitutes in such cases, giving less expenditure *per capita* in meeting the milk requirement. This is well illustrated in Table IV, constructed from data relating to 28 families of unemployed.

TABLE IV.—PERCENTAGE EXPENDITURE ON MILK SUBSTITUTES *PER CAPITA* BY UNEMPLOYED FAMILIES OF DIFFERENT SIZES

<i>Size of Family.</i>	<i>Percentage Expenditure on Milk Substitutes.</i>			
2	..	..	..	14
3	..	..	..	30
4	..	..	..	12
5	..	..	..	22
6	..	..	..	41
7	..	..	..	82
8	..	..	..	100

SOME ASPECTS OF LIQUID MILK CONSUMPTION

The importance of milk substitutes in the supply of milk fluid for the unemployed is thus apparent and may be further emphasized by the fact that 4 families (including 12 children) out of a total of 28 recorded no purchase of liquid milk, whilst 4 others (again including 12 children) bought not more than one quart of liquid milk per family during the week. These data corroborate the previous suggestion of grave under-consumption of liquid milk by poor families with children.

A comparison of the extreme groups in the income classification shows the relation between rate of income and *per capita* expenditure on substitutes for liquid milk.

TABLE V.—COMPARISON OF EXTREMES IN EXPENDITURE ON MILK SUBSTITUTES

Group.	<i>Per capita Expenditure in pence per week.</i>		
	<i>Baby Foods.</i>	<i>Non-baby Foods.*</i>	<i>Total.</i>
Upper middle class	0.44	0.18	0.62
Unemployed	0.07	1.21	1.28

Expenditure on milk substitutes by the high-income group was almost entirely confined to baby foods, by the low-income group it was almost entirely confined to non-baby foods. Utilization of preparations sold as baby foods was recorded amongst the unemployed class in four instances, but three of these were the result of gifts.

Low purchases of liquid milk by poor working-class families, with comparatively high purchases of milk substitutes, appears to be a feature of economy in milk buying by householders in that class. Table VI, which is an examination of total expenditure in meeting the milk requirement by different classes of consumers, shows the low rate of expenditure that resulted:—

TABLE VI.—WEEKLY *PER CAPITA* EXPENDITURE ON MILK AND MILK SUBSTITUTES

Group.	<i>Expenditure in pence.</i>		<i>Total.</i>
	<i>On Liquid Milk.</i>	<i>On Milk Substitutes.</i>	
Middle class	11.6	0.5	12.1
Good working class	7.8	0.8	8.6
Poor working class	6.3	1.0	7.3
Average	8.9	0.6	9.5

The marked jump in *per capita* expenditure on milk from the second to the first class in Table VI may be attributed in part to a change in the standard of living between these classes and in part to the fact that middle-class families take

* Although not sold expressly as infant foods, much of these preparations is used for infant feeding by poor families.

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a relatively greater share of the more expensive milks. In connection with the former point it may be assumed that the bulk of the milk purchased by middle-class families is used for culinary purposes, whereas in many working-class households its chief use is as an addition to beverages.

The difference between high-income and low-income expenditure in meeting the milk requirement is emphasized in Table VII, which compares expenditure by the upper-middle class with that by the unemployed class:—

TABLE VII.—COMPARISON OF EXTREMES IN TOTAL EXPENDITURE ON MILK

Group.	<i>Expenditure in pence per capita weekly.</i>		<i>Total.</i>
	<i>On Liquid Milk.</i>	<i>On Milk Substitutes</i>	
Upper middle class ..	13.4	0.6	14.0
Unemployed ..	3.7	1.3	5.0

Conclusion.—Two factors stand out prominently in the results of the inquiry: relatively low liquid milk consumption by families with children and the rapid decline in *per capita* expenditure on milk with reducing incomes. Both arise from the same cause, namely, reduced purchasing power, and both point to the conclusion that milk (and particularly liquid milk) is regarded as a comparatively expensive food article. Low consumption of liquid milk in the homes of growing children may be related to this attitude and not to general ignorance of the food value of fresh milk.

The difference between *per capita* expenditure on milk by the unemployed and by a group of well-to-do consumers (Table VII) is a striking example of the change in utilization by classes of different economic status. In the houses of the well-to-do milk is of first importance as an indispensable culinary article, while it is used for infant feeding and as an addition to beverages as a matter of routine. In very poor households it has two important functions: as an article of diet for infants and invalids and to add to beverages. It is reckoned too expensive for general culinary purposes, whilst as the chief ingredient of puddings it probably offers less satisfaction per unit of cost than other less fluid commodities. Low consumption by the poorer classes, therefore, may be accounted a feature of habit induced by having to regard liquid milk as a luxury.

REPORT ON HIGHER AGRICULTURAL EDUCATION

REPORT OF THE DEPARTMENTAL COMMITTEE ON THE RE-
ASSESSMENT OF ANNUAL GRANTS TO INSTITUTIONS
PROVIDING HIGHER AGRICULTURAL (EXCLUDING
VETERINARY) EDUCATION IN ENGLAND AND WALES, 1934.

MR. WALTER ELLIOT, Minister of Agriculture and Fisheries, on March 8, 1934, appointed a Committee to consider and report what annual grants for the maintenance of Higher Agricultural (excluding Veterinary) Education should be made to institutions providing such education in England and Wales, for the five academic years beginning on October 1, 1934.

The Committee consisted of the Earl De La Warr, Parliamentary Secretary to the Ministry (Chairman), Sir James Currie, K.C.M.G., K.B.E., Captain F. F. A. Heilgers, M.P., Mr. T. Williams, M.P., with Mr. J. A. Sutherland-Harris as Secretary.

The Committee submitted a unanimous Report on August 31, 1934. Since that date the Committee's recommendations respecting the grants to be made to individual institutions have been under consideration by the Ministry, and decisions have now been reached respecting the grants to be paid during the five years beginning October 1, 1934. The portion of the Committee's Report which dealt in detail with the financial position of the different institutions was of a confidential character. The Report, however, contained, in addition, observations and recommendations of a more general character which, in the opinion of the Minister, it is desirable to publish. The Ministry has accordingly, after consultation with the members of the Committee, decided to reproduce the Committee's Report in this JOURNAL in so far as it is not confidential.

In their letter of January 31, 1934, assenting to our appointment, the Treasury stated that they assumed that

REPORT ON HIGHER AGRICULTURAL EDUCATION

we should be invited to satisfy ourselves, when considering the financial requirements of each institution, that all reasonable steps had been taken to secure economies and to increase the receipts from local authorities and from other sources outside the Government grant. This was duly brought to our notice and we deal with these questions in this Report.

There are fifteen institutions in England and Wales which receive annual grants from the Ministry in respect of the provision of higher agricultural (excluding veterinary) education. They are as follows:—

University College of Wales, Aberystwyth (Aberystwyth).
University College of North Wales, Bangor (Bangor).
University of Cambridge: School of Agriculture (Cambridge).
University of Oxford: School of Rural Economy (Oxford).
University of Leeds: Department of Agriculture (Leeds).
University of Reading: Faculty of Agriculture and Horticulture (Reading).
British Dairy Institute, Reading (The British Dairy Institute).
South Eastern Agricultural College, Wye, Kent (Wye).
Armstrong College, Newcastle-upon-Tyne (Armstrong).
Seale-Hayne Agricultural College, Devon (Seale-Hayne).
Royal Agricultural College, Cirencester (Cirencester).
Harper Adams Agricultural College, Newport, Salop (Harper Adams).
Midland Agricultural College, Leicestershire (Midland).
The Horticultural College (for Women), Swanley, Kent (Swanley).
Studley College (for Women), Warwickshire (Studley).

Throughout this Report we use the term "Colleges" to include also the University Departments of Agriculture, except where the context otherwise requires. For purposes of convenience we shall refer to the Colleges by the short titles given in brackets above.

2. We considered that our terms of reference had relation primarily to the above-mentioned institutions and that we were not desired to review the claims of any other institution which might offer, or wish to offer, similar facilities unless we were specially requested so to do. In fact, we were subsequently asked by the Ministry to consider a special application from Bristol University, which does not at present receive a grant in respect of the provision of higher agricultural education.

3. We had access to a large amount of information in the Ministry's possession regarding the work and financial position of these Colleges, and we considered statements submitted by the Governing Body of each College on the special circumstances which they thought should be taken into account in reassessing their grants, together with an indication of their view as to the rate of annual grant which

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they considered necessary for the work of their institution during the ensuing five years. We immediately decided, however, that it was essential also to visit each institution to discuss its peculiar problems with the governing body and staff and to obtain personal contact with its work. We were everywhere received with the utmost courtesy. Our discussions were frank and informative and enabled us to form a clearer picture of the aims and achievements of each institution than is possible from written statements.

4. Owing to the short time at our disposal, we were obliged to confine ourselves strictly to the work done by the colleges and were unable to obtain any intimate knowledge of the educational work which is conducted by county councils. While we do not suggest that a review of the county work would, if we had been able to make it, have led us to put forward recommendations different from those we now submit, at the same time we feel that it would have been an advantage if we could at least have visited the Farm Institutes and thereby obtained a full acquaintance with the agricultural education of all types which is provided by institutions in this country.

5. Modern experience proves that it is scarcely possible to lay too much emphasis on the importance of education and research for the development of agriculture. The value to the farmer of the methods of disease prevention and control—in animals, crops and fruit—which scientific research has devised, and education disseminates, is incalculable. The scientific rationing of live stock on the basis of formulæ which relate the nutritive value of the foodstuffs to the work performed, or the carcass increase obtained, is now widespread among stock owners; but there is still much knowledge to be disseminated and much further information to be secured. In the case of dairy herds, the average milk yield per cow has been increased by nearly 60 gallons (from 482 to 539) during the past six years; and the careful study of progeny records with a view to the gradual elimination of second-rate sires is so far only on the fringe of development. Grass land, equally with the corn-growing areas, bears the undoubted impress of scientific breeding and selection. Yeoman wheat and Spratt Archer barley, both emanating from Cambridge, are now widely grown and their advantages recognized. "Resistance" oat has just been placed on the market. Improved

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strains of seeds mixture species, produced at Aberystwyth, now figure in the seedsmen's catalogues. The fruit growers' methods have in many directions been revolutionized as the result of the work of East Malling and Long Ashton.

6. If agriculture is to secure full benefit from marketing organization, research and education must lead the way in reducing costs of production, eliminating waste, and improving quality; and, in particular, adapting the produce to the market. The success of schemes for the organization of agriculture will depend not only on a high level of general knowledge and intelligence in the agricultural community, with which we are not primarily concerned, but also on the widespread distribution and application of technical knowledge which should lead in this sphere also to results comparable with those sketched above. Our attention has been drawn in this connexion to the recommendation of the recent Reorganization Commission for Fat Stock (para. 93 of their Report) that a special committee should be appointed to consider what modifications, if any, of the present system of agricultural education and research are required to adjust the system to the new organization of agriculture likely to arise from the establishment of the marketing boards. While we are in entire agreement with this recommendation, we wish to emphasize the point that the agricultural colleges of this country play a very important part in the necessary distribution and application of technical knowledge; we understand that it is generally found by experimenters that the farmers who are the first to introduce improved methods on their own farms, and, indirectly to their neighbours, are those who have received training at a college or farm institute. The colleges are training men to go into the farming world qualified either themselves to farm efficiently and economically, or to instruct others in the efficient production of agricultural commodities and the proper management of holdings, large or small. The county agricultural staffs, largely recruited from those trained at the colleges, have brought the farming community into contact with the work performed by the scientific workers at colleges and research institutes and given the best practical advice available. We consider, therefore, that it should be an essential feature of any attempt to reorganize the agricultural industry in this country that the agricultural colleges should be placed on

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such a footing that they can perform their function with efficiency, and we have framed our recommendations accordingly.

7. As mentioned above, we considered statements submitted by the colleges. In some cases, it seemed to us that colleges had not provided us with a full picture of their requirements, but had contented themselves with putting forward applications to cover minimum requirements which would still leave them in an unsatisfactory condition. We accordingly requested in certain cases the submission of revised statements so that we might be fully informed of the needs of all the colleges. We have been careful not to recommend increased grants without a full scrutiny of college requirements, but we considered that it was for us rather than for college authorities to eliminate items which though desirable might not be essential to the well-being of an institution.

General Maintenance Position.—8. We recognize that the colleges with which we are dealing are autonomous institutions, and that the Ministry's block grants are primarily intended to assist them to provide an efficient higher agricultural education without financial loss, after taking account of all other sources of income. We agree, however, with the opinion expressed by the last Reassessment Committee, in 1931, that it is a mistake to penalize an institution because it is successful. An institution that is so well managed that it pays its way, or even shows an annual surplus on ordinary maintenance, should not on that account alone suffer a reduction in its grant. We feel that a reduction on these grounds would penalize efficiency and that it is often the most successful institution which should be encouraged because it is the most likely to make the best use of its resources. Even an institution that can show a surplus on ordinary maintenance is not necessarily able to function with full efficiency, for it may not have that margin for development which is essential if it is to provide the best service, particularly in these days of rapid change in agricultural conditions. It should be possible for institutions to meet out of revenue margins the small capital requirements which are constantly arising in connexion with such developments.

9. Having set out our general views above, we will turn to the present position of the colleges. The last Reassess-

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ment Committee recommended certain increases of grants; but, owing to the financial crisis which developed in the autumn of 1931, it was not found possible to implement their recommendations, and it was even necessary to effect reductions in the rates of grant then in force. During the past few years the colleges have in general suffered further losses in income, mainly through reduced receipts from students' fees and increased farm trading losses owing to the fall in agricultural prices.

10. Reduction in income has necessarily meant reduction in expenditure. Not only have many urgent requirements been indefinitely postponed but drastic economies have had to be made in all directions. Many of these economies should not and cannot be maintained. They are particularly reflected in the low salary level at some colleges and in neglected maintenance. We deal with the question of salaries later in our report but we must point out that at many of the colleges the present rate of grant is insufficient to permit the minimum expenditure to be incurred which is essential for efficiency, much less to allow developments which must be undertaken by a progressive institution. The general picture we have obtained is one of colleges, whose existence and efficiency are essential to agriculture, condemned to stagnation by lack of funds and in consequence unable to play their full part in the leadership of the agricultural industry.

General Organization : Relations with Local Authorities.

—11. We have considered the present general organization of the system of higher agricultural education in relation to certain county areas. It cannot be said that there is any absolutely uniform system in being, but the majority of the colleges have a reasonably close connexion, and, in one or two cases, the connexion is very close indeed, with a definite geographical area. For the purposes of local investigational work and the provision of scientific advice, groups of counties are organized as provinces, with a college or university as the headquarters of the province. In most cases, the college or university which is the provincial centre also provides higher agricultural education.

12. The local support received by the colleges, however, varies greatly. It normally takes the form of direct grants and the award of scholarships. In some cases, it is very considerable, and in one or two it is non-existent. Two

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institutions, Oxford and Studley, have no county connexions. Cirencester receives no direct county grants, but benefits by scholarships from three of the five counties in the Western Province. Swanley and Cambridge receive small county grants but do not benefit by scholarship awards from local authorities. These five colleges have in the past been regarded more as national than local institutions and this accounts, to some extent, for their slender local connexions; Cambridge is the only one of the five which is also a provincial centre. The remaining colleges with which we are dealing in this report have important local attachments. They are all provincial centres and receive local support both by grants and scholarships, though we feel that this support is not always adequate.

13. We do not consider it essential in the light of modern transport facilities that there should be a complete area system in operation for the provision of higher agricultural education as distinct from specialized advice and investigation. It is the farm institute, not the college, which is designed more especially to meet the needs of the student whose concern will normally be that of the agricultural practice of his own district. The college provides degree and diploma courses for those who wish to obtain as wide a training as possible in all branches of agriculture and the sciences underlying them. There is no inherent reason why the organization of higher agricultural education should be on an area basis, and we should not be disposed to regard such an organization favourably if it had the effect of creating a large number of indifferent institutions rather than a small number of efficient ones. We are not, therefore, concerned, in making our recommendations, with the preservation of any explicit area system, but, at the same time, we wish all the colleges to co-operate closely with the counties around them, as this will enable them to tap all the available sources from which students may be drawn and will allow them to make their general influence on the agricultural community more widely felt.

14. The two vital considerations which must be taken into account in reviewing the claims of each college are, first, the work that is being carried out by the college in the training of students, and secondly the service that it is rendering to the area around it and the support that it is receiving in return. We have considered all the institutions from both these points of view. In one case, that of Harper

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Adams, we recommend that it should be made a condition of the continuance of grant that a scheme of co-operation with the neighbouring counties should be evolved. As regards the other institutions with which we are concerned, except the Midland and Wye, we are not satisfied that adequate local support is being received in view of the very valuable services which these colleges are in a position to render to the farming community in their neighbouring counties. We shall draw more particular attention to this matter later in our report when we come to deal individually with the requirements of each college. It is sufficient to point out, at this stage, that we should not only like to see an increase in the grants from certain counties, but also some increase in the provision made for scholarships and a greater co-operation which should make the facilities offered by the colleges more widely known and appreciated than they appear to be at the present time.

Staff and Salaries.—15. At most colleges, the existing staff is adequate to meet present demands. In one or two cases, however, additional members of staff are required and we deal with these later in our Report when we come to consider each college separately. We do not think that the colleges are maintaining staffs larger than is justified by the number of students, except in one case where we were assured that the governing body would, when practicable, consider the possibility of reductions in personnel.

16. We are not at all satisfied with the level of salaries paid at most of the colleges. In particular the level of salaries at the Welsh colleges and at Studley and Swanley is deplorable, and we have taken this into account in framing our recommendations. We understand that there are no uniform scales in operation in universities or colleges as a whole which could be generally adopted as a normal standard. We are, therefore, considerably handicapped by lack of any criteria whereby to judge the salary level at any particular college. In the case of University Departments of Agriculture we recommend that grants be so adjusted as to permit the same salaries to be paid as would be paid to a teacher of the same standing in another department of the university concerned. We made inquiries on this point in the course of our visits and have accordingly recommended certain increases in the grants to Aberystwyth, Bangor and Reading to cover necessary salary increases.

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The position at agricultural colleges is more difficult. At the Midland, we were informed that the salary scales had been purposely fixed on a lower level than that of the Burnham scales for secondary schools as it had been assumed that the opportunities for promotion were better than those in a secondary school. Such an assumption does not seem to be justified at the present time. We recommend that the salaries at a college which provides instruction of a degree standard should be comparable with those at a provincial university.

17. In addition to the low normal salary level at certain colleges we found that, at some colleges, an economy cut had been imposed in 1931. We were pleased to be informed at the Midland that the governing body now felt able to restore the cut, but three colleges, Seale-Hayne, Studley and Swanley, do not feel able to do this without increased financial aid. These colleges should be in a position to treat their staff as favourably as the other colleges with which we are concerned, and we recommend, therefore, quite apart from the question of low normal salaries, increases in their annual grants to allow them to restore salary cuts without imposing too great a strain on their financial resources.

18. We understand that Studley is the only college which has not adopted a superannuation scheme and that it could not contemplate doing so without extra financial assistance. It is highly desirable that the college should adopt such a scheme.

Students: Scholarships.—19. In 1932-33, there were 1,100 students at these colleges taking the longer courses. Though this was nearly 200 less than in 1930-31, it was nearly 100 more than in 1928-29. The circumstances at each institution vary so much that it is difficult to draw any firm conclusions from the figures that were before us. It seems true to say, however, that there was a general rise in the number of students at these colleges up to 1930-31, in which year the students at 10 of the 15 colleges showed a considerable increase over 1928-29. The advantage gained during these years was, however, generally lost in the two subsequent years, but it is gratifying to note that a net gain over the four years can be claimed. One college, Aberystwyth, has even succeeded in increasing its student numbers steadily through the period and is still growing. Another, Leeds, maintained the advantage gained by 1930, though its

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numbers have decreased in the current year. The remainder have for the most part suffered losses, but there are encouraging signs that the tide is turning. In the current year, seven of the fifteen colleges have increased their numbers and two others are holding their ground. The fall has, as would be expected, been mostly confined to fee-paying students. The number of scholarship holders has if anything tended to increase, and now accounts for a higher proportion of the students.

20. Reading has easily maintained its lead as the largest of the colleges, with 212 students in 1932-33. In 1930-31, it reached a total of 235, but the agricultural depression prevented it from maintaining this figure. The two next largest colleges, Wye and Cambridge, have felt the depression rather severely, but they still have 164 and 125 students respectively, and the numbers at Cambridge are going up. At the majority of the colleges, however, the totals range from 40 to 60. These may appear to be small for such institutions, but we would not necessarily be perturbed at such limited numbers or even at a shortage of students, which may be but temporary, provided the instruction given is good and the quality of the men turned out is such that agriculture and the nation will benefit by a moderate expenditure of public funds for this purpose. While, therefore, we have taken due note of the numbers of students at the various colleges, we have also made inquiries to satisfy ourselves that, where the students are comparatively few, their quality justifies the grants made, and account has been taken of this in making our recommendations. We appreciate the financial conditions which, in one case at least, have forced a college to accept students whom in better times it might have regarded as unsuitable to profit by the instruction it could provide; but we would wish to recommend that colleges should be pressed to satisfy themselves that all their students are suitably equipped to benefit by their course of instruction. We do not mean that institutions should refuse to admit those who may be handicapped by a comparatively rudimentary general education. On the contrary we would welcome a greater influx of such students, provided they have the ability and the will to overcome their handicaps, as we understand those who receive scholarships under the Ministry's scheme for the sons and daughters of agricultural workmen are in the habit of doing. We would wish to see colleges, however, adopt a more rigorous

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attitude in the weeding out of students who are not availing themselves of their opportunities.

21. We understand that some 70 per cent. of the students at these colleges are drawn from the urban classes, though the position varies according to the college; for instance, at the Midland and the Welsh colleges over 50 per cent. of the students are the sons or daughters of farmers, small holders or farm workers, whereas, at Wye, such students only account for 15 per cent., and, at Cambridge, for 24 per cent. It has always been the case that a large proportion of these students are of urban origin and it should remain so, for agriculture needs a continuous stream of recruits from the towns, and the colleges are their natural training ground. At the same time, we feel that the agricultural community has in the past taken too little advantage of the facilities for higher instruction which lie at its door through the existence of the colleges. We would like to see a greater number of students drawn from agricultural circles. The factors that have militated against this in the past appear to be the apathy of many sections of the agricultural classes towards the advantages of a scientific training, and the inability to find the fees necessary to cover the long courses provided by the colleges as compared with the shorter courses obtainable at the farm institutes. We hope that a restoration in some measure of agricultural prosperity will help to overcome the latter difficulty, and we were informed at more than one institution that the new schemes for the organization of agriculture were bringing the farming community to a better appreciation of the value of a scientific training. In the meantime, however, the position must be faced that the agricultural classes generally are not at present able to send their children to attend long college courses. To meet this situation we strongly recommend an extension of the system of agricultural scholarships.

22. We understand that the Ministry has a scheme whereby a limited number of scholarships are available annually for the sons and daughters of agricultural workers and others in a similar position; and that, prior to 1931, it also had a scheme for the award of post-graduate scholarships for intending agricultural organizers and teachers which normally included a period spent abroad. We realize that this matter is not strictly within our terms of reference, but we feel that it is intimately connected with the value of the services provided by the colleges and paid for in part by

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the Ministry's annual block grants. We are glad to learn that the Ministry has just increased the number of its scholarships for the sons and daughters of agricultural workers tenable at colleges, which was reduced in 1932. We would suggest, however, that any limit imposed on such awards should not be rigid, but that the Committee administering the scheme should have discretion to make a larger number of awards if it considers that the applicants are of sufficient merit. We also suggest that the Ministry should recommence the award of scholarships for intending organizers, including as an essential part of the latter a period of foreign travel.

23. In addition to the Ministry's scholarships, most counties award a number of scholarships tenable at colleges. We are not satisfied with the present position regarding these scholarships. In the first place, we feel that there are not sufficient of them: for instance, we would like to see the Eastern counties supporting Cambridge and benefiting their own farming community by the award of valuable scholarships as well as by the small grants they make at present. In the second place, the value of county scholarships, particularly in Wales, is often inadequate to enable the children of the agricultural classes to accept or apply for awards. In the third place, we are not convinced that counties have sufficiently helped the colleges in obtaining local students, whether by scholarships or otherwise, by making the available facilities known in their areas. We feel that counties could co-operate with colleges far more in this respect than they do at present, especially in virtue of their close connexion with both rural and secondary schools. In particular, we recommend that the continuance of grant to Harper Adams should be dependent upon some scheme being evolved for such co-operation between the college and the counties.

24. We hope that, if the recommendations set out above were carried out, a considerable increase would be seen in the students drawn from the agricultural classes. At present they only number some 350 to 400, which probably represents an annual entry of about 150 to 175. When it is recalled that there are well over a million persons occupied in agriculture, of whom about a third are employers or are working on their own account, it will be seen that the provision being made at present for higher agricultural training touches but a very small fraction of the agricultural popula-

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tion. It is doubtful, however, how far our suggestions for improving this position will have the desired effect until there is a material rise in the general level of education in many elementary schools. We feel that in some districts, at any rate, the standard attained by the rural schools is not such as to allow any except the most brilliantly gifted to attain a level worthy of a scholarship at a secondary school or, still less, high enough to permit profitable use to be made of an advanced training such as a college provides.

25. We suggest that the facilities offered by the colleges might be extensively used for the training of prospective school teachers, and that students who contemplate teaching in rural schools should be required, or at least given the opportunity, to take a course of instruction at an agricultural college as part of their ordinary training. Some of the authorities concerned are beginning to recognize the value of a "rural bias" in the training of teachers: for instance, Kent is considering the adoption of a scheme with this end in view, in co-operation with Wye. We suggest that the authorities might be invited to examine the question, and that with that object the Ministry might approach the Board of Education on the subject.

26. We have envisaged an increase in the number of students drawn from the agricultural classes, but there might be a tendency among such students to seek salaried posts after their training rather than to go back to the land. We think, therefore, that steps would have to be taken to ensure so far as possible that a fairly large proportion were attracted to a career on the practical side, as our object is to raise the average level of attainment among the agricultural classes by training individual members who will go back to a farm and spread their greater knowledge amongst those with whom they work. This might be effected by awarding scholarships for diploma as well as for degree courses, as the former are normally designed more particularly for those intending to adopt a practical farming career. We would, indeed, be disposed to go so far as to suggest that, in order to insure that a large proportion of those being trained by means of scholarships actually entered the agricultural industry, the awards should be given to those who had such an intention in preference to those who were seeking posts of more academic character. Of the students at present in training, we understand that over a third intend to undertake practical farming, a fifth are seeking

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posts connected with farming, such as estate management, land agency, etc., and a quarter want administrative, educational or research posts; the remainder are waiting to see what opportunities are available, but very few do not intend to adopt an agricultural career. If any change in this balance is required, it should be in the direction of increasing the element aiming at a practical farming career.

Courses of Instruction.—27. The majority of the students are taking agricultural courses, which normally include a certain amount of instruction in dairying, poultry-keeping and horticulture such as is required for the management of a general farm. All the colleges should be in a position to give this subsidiary instruction; and our attention has, in several cases, notably Aberystwyth, Seale-Hayne and Reading, been drawn to inadequacies in this direction. We deal with these points in connexion with the individual colleges. The position is on the whole satisfactory, and, in particular, Reading, as a result of the establishment of a chair of horticulture, seems to be framing a programme of horticultural instruction which will adequately meet the need for the training of higher qualified horticulturists arising out of the rapid developments in the horticultural industry in this country. We also approve a plan for the provision of horticultural instruction put forward by Seale-Hayne to meet the peculiar needs of the West of England, as higher instruction in horticulture is at present practically confined, as far as men students are concerned, to Reading and Wye.

28. We would suggest that the Ministry should invite the colleges to take steps to include a measure of general instruction in the facilities provided, for it must be remembered that for many of the students this may be the last chance of offering them education in the widest sense of the word. It is to be hoped that many of them will go on to assume positions of leadership in their industry, and their ability to take broad and comprehensive views of the problems with which they are faced may be an important determining factor in the future of the industry. We see the difficulties that would be involved in any attempt to introduce general instruction into the colleges' normal curricula, but much might be done by such means as obtaining outside lecturers to give lectures on general topics, organizing debating and essay societies, and so forth. By such methods, the students' general interests might be stimulated,

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and they might be helped to a broader outlook than could be provided by the ordinary agricultural courses.

College Farms and the Provision of Practical Instruction.—29. It is essential that every college should have an adequate farm conveniently situated, and that it should endeavour to give a wide range of farm classes, particularly to those students who have not had any practical experience before entering on their course of training. With the exception of Cirencester, we are satisfied with the provision made by the agricultural colleges, and our recommendations take into account the need for Cirencester to acquire the use of a suitable farm. The University Departments of Agriculture, however, are not so conveniently placed as the agricultural colleges for the provision of practical farming experience, since they are situated in towns; in fact some do not claim to give this experience, but mostly rely upon it being acquired by students on farms during the vacations. We are convinced, however, that all the University Departments should have good, well-run farms as accessible as may be practicable. In fact, most of them have such farms at the present time, and we draw attention below to the few cases where the existing conditions are unsatisfactory from this point of view. But we feel that some of the University Departments which have first-class farms, although they run them exceptionally well, might perhaps make more use of them for the practical instruction of their students, by more frequent farm classes.

30. We must refer more specifically to Leeds and Reading. Leeds depends, for the purposes of practical instruction, on the facilities available at Askham Bryan, some 18 miles distant, where the Yorkshire Council for Agricultural Education are planning to establish a farm institute. We do not consider that the distance in these days of advanced transport facilities presents insuperable difficulties, though we would have preferred to see Leeds using some farm in its more immediate neighbourhood. As however, it has already been decided to develop Askham Bryan, when the necessary funds are available, we are content to recommend the continuance of support to Leeds, on the understanding that the plans for the establishment of a farm institute at Askham Bryan are proceeded with as quickly as possible.

31. Reading possesses a farm in comparatively close proximity to the University, but it is too small adequately to meet the needs of a teaching institution. The University

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has just purchased a larger farm in the neighbourhood. This is an essential step and we make provision in our recommendations for an increased grant to cover the necessary loan charges involved.

32. We agree generally with the suggestions contained in the Ministry's memorandum on the object of farms attached to colleges and farm institutes, which was included as Appendix IV to the report of Lord Bledisloe's Reassessment Committee in 1927. The management of a college farm should be dictated primarily by economic requirements, so that the students and the visiting farmers may have an opportunity of contact with a practical demonstration of farm management. Subject to this fundamental principle, modifications of the scheme that would be adopted were the farm run on purely commercial lines should be introduced to provide facilities for practical instruction, occasionally on lines which are temporarily unremunerative. We consider that the economic and teaching aspects can and should be so combined as to demonstrate not only particular branches of farming practice but also the efficient and economic management both of such branches and of the farm as a whole, and this is the ideal at which all the colleges should aim in the conduct of their farms.

33. We agree with the last Reassessment Committee that as a general rule the chief agricultural lecturer in a college should be responsible for the management of the college farm. This is the best way of ensuring that the theoretical and practical instruction form a connected and consistent whole. Most of the colleges have adopted this practice though there are still one or two where the direction of the theoretical and practical instruction is in different hands. We discussed this matter with the representatives of the colleges concerned, and we are satisfied to accept the assurance that, in the particular circumstances of these colleges and given the present personnel, the existing practice is the more desirable.

Fees.—34. The recent fall in the numbers of students, to which attention has already been called, has considerably reduced the income from students' fees at most of the colleges. Not only, however, have the total receipts decreased, but there has also been a fall in the average fee received, owing to an increase in the proportion of reduced fee and scholarship students. Even at Studley, where there are no local authority scholars, the average fee has fallen

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owing to special reductions in the form of bursaries made by the college to about a quarter of its present students. Such remissions of fees, and the acceptance of local students at reduced fees in consideration of county grants, might mean a loss to the college in normal times if it could fill all its available places with full fee-paying students. At the present time, however, colleges are sometimes only too willing to take at reduced fees those who would not otherwise be able to attend the college. It is highly desirable that such students should be able to go to the colleges, but we realize that the colleges are not able to reduce their fees for this purpose indefinitely unless they obtain increased support from the Ministry or the counties. We think the position would be best met by increases in county grants, in return perhaps for an increase in the number of reduced-fee places to local students, and in increased county provision for scholarships as already suggested. It follows naturally from this that we are convinced that no question arises of any increase in the level of fees being desirable. The present level is on the high side and puts the colleges largely out of the reach of members of the agricultural classes unless they can secure aid by means of scholarships or remissions.

Financial Position of the Colleges.—35. The last Reassessment Committee found that, during the period 1925-26 to 1929-30, the colleges as a whole incurred a net deficit of over £21,000. This appears to have been due to the net deficit on the college farms and trading departments, which they state to have been over £30,000 during that period. It is very difficult to give figures which would provide a clear idea of the present position, since the colleges differ widely in their conditions and in their accounting procedure. It seems, however, true to say that, broadly, the position during the last five years has on the whole been more favourable, but is now deteriorating owing to reduced income. The net deficit over the period was about £2,000 and the net deficit on the college farms and trading departments amounted to some £13,000. The tendency during the last two years, however, has been for increased losses to be incurred both on the ordinary maintenance of the colleges and on the farms and trading departments.

36. Several of the colleges are burdened with heavy interest charges on loans and mortgages and with accumulated deficits in the form of bank overdrafts. We would like these colleges to receive such grants that by careful manage-

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ment they would be able gradually to remove these encumbrances which handicap their development. Three colleges made application to us for increased grants or special grants to enable them to meet their accumulated deficits. In each case, we recommend an increase of grant which we feel should be sufficient to enable these colleges by careful administration to make suitable provision not only for their other requirements but also to meet these deficits.

Capital Requirements.—37. During the last few years, colleges have had to depend entirely on their own resources to provide for urgent capital requirements. This has, in effect, meant that it has not been possible to carry out any developments requiring considerable capital expenditure. In some cases, however, the position is even more difficult, as a shrinkage in income has precluded any capital expenditure at all, even on items involving only a small amount. There has, therefore, been a considerable accumulation of needs involving capital and semi-capital expenditure during the last few years. While we agree that the Ministry should, in the future as in the past, contribute on a £ for £ basis towards the cost of items requiring considerable capital expenditure, we consider, as already stated, that the annual grants should be so assessed that the colleges should have, by careful management, a margin for small capital developments. This is essential if they are to keep up to date as training centres for students and demonstration centres for farmers. In dealing with the particular colleges we draw attention to one or two large capital schemes which we should like the Ministry to support on a £ for £ basis as soon as funds are available.

Relations with the Ministry and County Committees.—38. We wish to stress, as had indeed been done by previous Reassessment Committees, the desirability of close contact between the Ministry and the colleges. We realize that college governors and principals frequently consult the Ministry's officers in London, and that the Ministry's local inspectors visit the colleges from time to time. But contact by these means is not sufficient to enable the Ministry to exercise that influence over college policy which is desirable in view of the relatively large contributions which the colleges receive from public funds. Neither is an *ad hoc* Reassessment Committee appointed every four or five years an adequate safeguard that these public funds are being applied to the best advantage from the national point of

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view. We would, accordingly, suggest that representatives of the Ministry, including high officials and if possible the Ministry's Parliamentary Secretary, who will normally be the Chairman of the last Reassessment Committee or the Chairman of the next, should visit each college at least once a year in order to discuss with the governing body and staff the general position of the college. They should be accompanied by such members of the Ministry's staff as seem likely to be required in order that technical matters may be discussed on equal terms with the college staff.

39. The last Reassessment Committee recommended that the Ministry's technical officers should make an annual inspection and report on each college farm. We understand that this recommendation was not welcomed by all the college authorities, but we would like to press for its extension to cover all the colleges. The reports which have been made were of great use and interest to us, and all college farms should be inspected in this way, once a year if possible, and the reports should be submitted to the governing bodies concerned. Such a procedure would be of benefit both to the farms and the Ministry.

40. We feel that it would also be desirable for all members of the County Committee responsible for agricultural education to visit periodically any college to which the county is making a grant as a means of securing that increase in co-operation between colleges and counties which we consider so necessary.

41. As already indicated, we are satisfied that all reasonable steps have been taken to secure economies, and indeed that many of the economies made cannot be regarded as anything but temporary if they are not to react very unfavourably on the services rendered by a college.

42. With regard to increased receipts from other sources than the Government grant, we have already said that we think the contributions of local authorities are inadequate in most cases, particularly when it is recalled that sixty per cent. of these contributions is met out of State funds and only forty per cent. falls to be met out of rates. Increased grants from local authorities will, therefore, automatically mean increased support from the State, and we have accordingly considered whether there are any other directions in which the colleges may seek increased income. We have, however, come to the conclusion that, except perhaps in one case, the income of the colleges cannot be increased any further from other sources. At agricultural colleges,

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such sources must be confined to endowments and fees; at university departments, to fees and contributions from general university funds not derived from the State through the University Grants Committee. We have already said that we could not recommend any increase in fees. We do not see how endowments can be appreciably increased at the present time and we should not like to make any recommendation which might weaken the response to appeals which colleges may have to launch to raise their share of capital expenditure on necessary developments, when State aid is again available for this purpose. We have considered the provision made by the universities for the agricultural departments and, with the exception of the one case referred to above, we are satisfied that they have made such provision as was within their resources. In particular, the departments at Bangor and Aberystwyth have received special assistance from the University of Wales, and we understand that the University of Reading has put considerably more money into the Faculty of Agriculture and Horticulture than it was anticipated would be necessary a few years ago, particularly in connexion with the establishment of the new Chair of Horticulture.

THE GLASSHOUSE SYMPHYLID AND ITS CONTROL

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IN 1912 Theobald¹* recorded the occurrence of the "White Insect of Guernsey," *Scutigerella immaculata* Newport, in glasshouse soils of Guernsey, and associated it with injury to young tomato plants. There seems to be no further record of the animal causing injury under glass in the British Isles until 1926, when Miles² reported infestation of glasshouse soils and injury to tomatoes in Guernsey, and observed injury to lettuce in the Lea Valley. Since then, infestation has been found to be more general. In 1930 Walton³ recorded persistent and serious attacks on tomatoes in the south-west of England, and stated that, in the worst cases, the plants were actually killed as the result of direct attack by the symphylids. In 1931, Mr. N. J. Macpherson of the Lancashire Horticultural Staff discovered the creatures in numbers at the roots of failing lettuce plants in the Fylde (Lancashire) glasshouse area, and invited the writers to co-operate in dealing with the outbreak. Investigations were started and the present account deals with the results so far obtained.

Description and Life History.—*Scutigerella immaculata* Newport, is a small white active animal (Fig. 1), resembling the millipedes and centipedes. At present, it has no generally accepted common name. In literature dealing with the animal as a pest, it is referred to as the "glasshouse symphylid," the "garden centipede" and the "glasshouse centipede." In the course of work in Lancashire, the writers have found the animals referred to as "white mites," "millipedes," "sprites" and "scooters." The last name appears to be derived from the scientific name *Scutigerella* and refers to the active running habits of the creatures when turned up in the soil. "Sprites" also appears to be a tribute to the activity of the animals when disturbed.

* For references, see page 457.

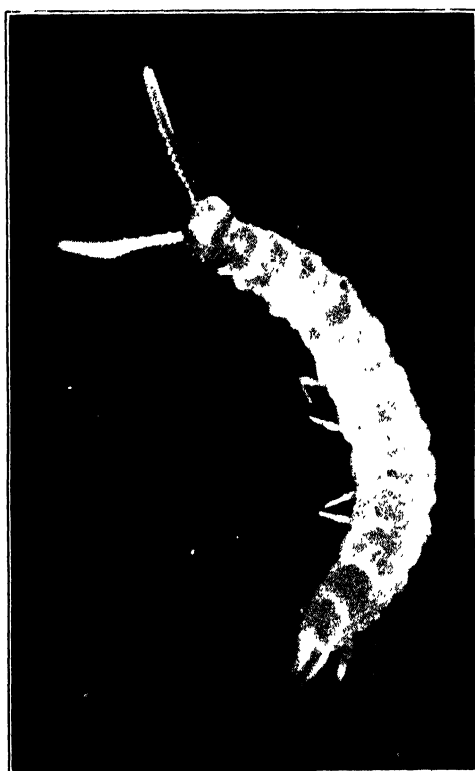


Fig. 1. *Salicetella unicolor* Nyctel. 1910.

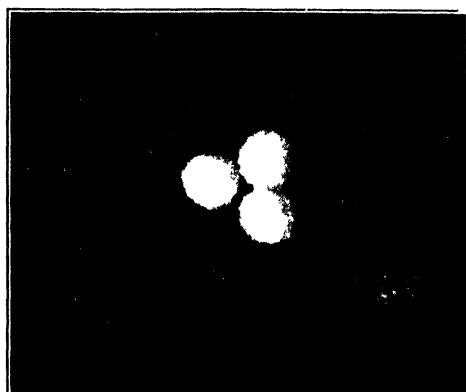


Fig. 2. Eggs of *Salicetella unicolor* Nyctel.

Courtesy Photos. H. B. Miles

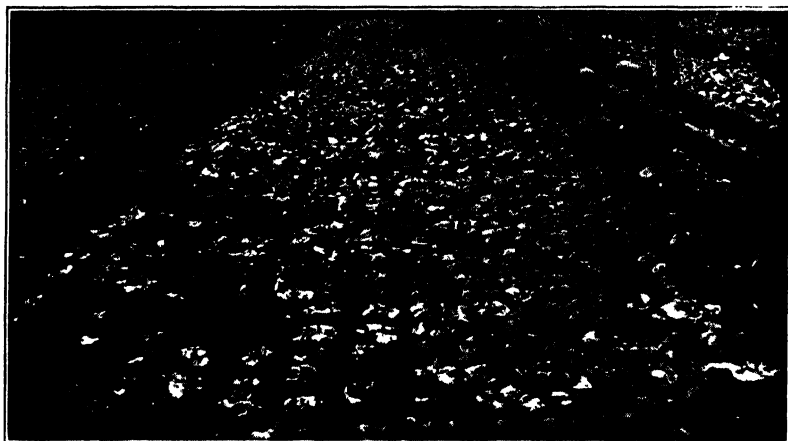


FIG. 3. Attack by *Scutigerella immaculata* on lettuce under glass. Plant dying from attack in the left foreground. Patchiness is typical of *Scutigerella* attack.



FIG. 4. Typical tomato plant from plot treated with carbon bisulphide emulsion before cropping. Note good root development.

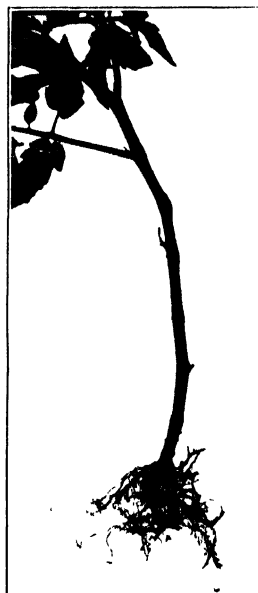


FIG. 5. Typical tomato plant from untreated check plot. Note poor root system as result of symphyliid attack.



Copyright Photo H. W. Miles

FIG. 6—General view of typical plot of tomatoes after treatment with carbon bisulphide emulsion



Copyright Photo H. W. Miles

FIG. 4. General view of plants on an area which had no treatment against *Scutigerella*

THE GLASSHOUSE SYMPHYLID

The adult symphylids are delicate, slender, white creatures measuring from just under to just over $\frac{1}{4}$ in. in length. They have a distinct head with long flexible antennæ, twelve pairs of legs, and, on the last segment of the body, there are two stout projections, the cerci or tail feelers, a pair of sensory hairs and the silk glands. The length of the antennæ varies according to the number of segments present, 21-36 segments being most common. This variation in the number of segments in the antennæ is emphasized by the fragile nature of the organs. They are easily broken during the animal's own activities, or when separating the animals from the soil. The legs are white; the first pair consists of four segments each and the remaining pairs of five segments each. Each leg terminates in a pair of simple claws.

The animals are exceedingly active and quick in all their movements, and this, in conjunction with the structure of the mouthparts, suggests that they may normally be carnivorous. They live entirely in the soil but do not make definite runways or burrows. Observations show that, where the soil is sufficiently consolidated to permit the regular use of soil cracks and crevices, these may be partly lined with silk from the caudal silk glands to enable the animal to pass along them quickly. Where the soil is loose, the symphylids work their way between the soil particles, but this is a slower process than movement through the silk-lined crevices.

Eggs are laid singly or in batches of 2 to 20, and occasionally partly covered with silk and attached to soil particles or decaying roots. They are spherical (Fig. 2), less than half a millimetre in diameter, and divided into hexagonal areas by a regular network of ridges. When first laid they are whitish, but in a few days they become a creamy colour. Hatching takes place in a fortnight to three weeks.

When it first leaves the egg, the larva somewhat resembles a springtail. The antennæ are short and have only five segments. There are six pairs of legs and the last body segment bears only very minute cerci and a pair of rudimentary legs. Within two days, the larva moults and acquires an extra pair of legs and three additional body segments. During the next five or six weeks, there are several moults, accompanied by increases in the number of antennal segments, body segments and pairs of legs, until the animal reaches

THE GLASSHOUSE SYMPHYLID

maturity. There are no easily recognized characters by which the sex of living symphyliids can be determined. It has been suggested that females are larger than males, but this is not invariably the rule.

Symphyliids can exist for long periods without any visible food material, and it has been suggested by Williams⁴ that they may feed on protozoa and other soil organisms. Feytaud⁵ showed that they were unable to live for any length of time in soil that had been sterilized, and Filinger⁶ found that, when fed on lettuce leaves, the animals lived for as long as two years and four months. The symphyliids brought into the laboratory at Manchester in October, 1933, remained alive in the soil in which they had been taken for upwards of a year, although no plant material was added to the soil during that period.

Plants attacked and the Nature of the Injury.—

Records from abroad mention beans, asparagus, maize and asters among the plants injured by *Scutigerella immaculata*; but in the British Isles, only glasshouse crops have been affected, particularly tomatoes, lettuce and sweet peas.

With tomatoes, attack starts a few days after setting the plants in their permanent sites. The old roots are injured to some extent and the new roots are devoured as fast as they develop. This prevents the plants from making a new root system and seriously delays their becoming properly established. For a fortnight or three weeks after setting out, the plants make little growth and flag during the daytime. The stem becomes bluish, the upper leaves dark green and sometimes the lower leaves become yellowish, by which time the grower realizes that something is wrong with the plants and replaces them. When serious infestation occurs, two or more replacements may be necessary, and the consequent delay often means the loss of the early market.

Lettuce may be attacked as early as November and injury continues until February or March. Damage is most noticeable at the roots of young plants; they are often bitten through by the symphyliids, or the roots are badly injured by penetrating holes and extensive surface gnawings. Corky callousing develops at the point of injury and gives the attacked roots a galled and gnarled appearance. Injured plants make little growth and may die from root rot or *Botrytis* attack.

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Where sweet peas are grown in infested soil, the roots are so badly injured that the plants may fail entirely or make such slow progress that the grower despairs of their becoming profitably established.

"Patchiness" in the crop is fairly typical of attack by symphylids, and only rarely is a house uniformly infested; thus the plants appear sickly in irregular areas, along the wall side, around the pillars, near hot-water pipes and beside the pathways. Fig. 3 shows a house of lettuce seriously attacked; the plants in the foreground were dying from persistent injury; those in the right corner were normal; and those in the bed on the left were so badly attacked that most of them had to be replaced.

Distribution of the Symphylid in the Soil.—The glasshouse symphylid appears to be world-wide in distribution and is fairly common over the British Isles; but appears in greatest numbers in market garden soils where the organic matter content is high. It usually infests the top 1 in. of soil, but will penetrate deep into the sub-soil to escape from unsuitable conditions. In a glasshouse in Lancashire, it was found that the symphylids descended to a depth of 20-24 in. into a clay or marl sub-soil by means of soil-filled cracks or faults, although, normally, they were most abundant at a depth of 5-12 in.

Temperature and the presence of food material affect the distribution of the symphylids in the soil. The optimum temperature for their activities appears to be 50-60° F. As the temperature rises above this point, the animals leave the surface soil and remain at greater depths where the temperature is lower. This preference for cooler conditions probably explains why injury to crops under glass is confined to the winter months. It was found, however, that the creatures would concentrate in the top 3 in. of soil when seedlings were planted out, even though the surface temperature was slightly above this optimum.

Control Measures—The control of *Scutigerella immaculata* has received a good deal of attention since 1915, when clean culture, proper crop rotations and flooding were recommended. Chemical treatments and steam sterilization have formed the subject of most investigations and, with both, promising results have been obtained. Filing⁶ in America found that steam sterilization would kill the animals in the upper layers of the soil, and that such soil fumigants as

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paradichlorobenzene, calcium cyanide and carbon bisulphide were all more or less effective. Kearns and Walton⁷ have recorded satisfactory control with steam sterilizing, using buried grids. From these experiments, it is apparent that where steaming apparatus is available it can be used to give relief from the pest, particularly if the animals are attracted into the surface soil before the steaming is begun.

On many holdings, however, steaming plant is not installed, or the trouble is not discovered until the crop has been set out. In these circumstances, some other treatment is necessary; and, in order to meet this requirement, the investigations in Lancashire have been concerned with chemical treatments.

Preliminary Tests.—Preliminary experiments, in 1933, showed that the creatures could be killed within fifteen minutes by the application of carbon-bisulphide emulsion consisting of 50 per cent. carbon bisulphide and 50 per cent. sulphonated castor oil at strengths of 1 in 60 and 1 in 80. Plants received some injury where the solution was splashed on their stems.

The preliminary tests in glasshouses were followed by laboratory tests where the symphylids were placed at known depths in cylinders of soil and subjected to applications of the carbon bisulphide emulsion. From these tests, it was seen that carbon bisulphide emulsion was toxic to the symphylids as follows:—

Dilution	1/100	effective to a depth of	3 in.
"	1/80	"	6 "
"	1/60	"	10 "

Experiments in Infested Glasshouses: Pre-planting Treatment.—In the spring of 1934, a glasshouse that had been badly infested with symphylids the previous season was sampled for information on the distribution of the animals and the intensity of infestation. The soil was then trenched to a depth of 10 in., the sub-soil forked over, and carbon bisulphide emulsion at 1 in 60 was applied to the sub-soil at the rate of one gal. per sq. yd. The regular dressing of farmyard manure was then applied and the trench filled in. When a few yards of trenching had been completed, the bed received a surface treatment with emulsion (1 in 100) at the rate of 2 gal. per sq. yd.

This treatment aimed at reaching those symphylids that were in the sub-soil and ensuring that those in the top spit of soil were destroyed. Certain areas were left untreated

THE GLASSHOUSE SYMPHYLID

as check plots. The house was planted with tomatoes 24 hours after the treatment, from which they showed no ill effects. The root systems developed rapidly, and within a few days the plants seemed well established. Plants were lifted and examined at weekly intervals for the presence of symphyliids, both on the treated and untreated plots, and the following data are from typical plants:—

SYMPHYLIDS PRESENT

Date	TREATED PLOTS								UNTREATED PLOTS							
	Plant No.								Plant No.							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Mar. 19	0	0	0	1	0	1	0	0	0	17	12	5	16	—	—	7
" 26	0	0	—	—	0	0	0	0	5	3	—	2	9	32	5	—
Apr. 3	0	0	—	—	0	0	0	0	—	8	9	—	10	22	—	3
" 10	0	0	0	—	0	0	0	0	—	4	9	—	14	—	—	—
" 17	0	0	—	0	0	—	0	—	—	7	8	0	4	—	10	—
TOTAL	32 plants examined 2 symphyliids present.								25 plants examined 221 symphyliids present.							

The plants on the treated areas made remarkably good growth and the differences between them and the plants from untreated plots are shown in Figs. 4 and 5 and 6 and 7. Comparison of typical plants from the treated and untreated plots, three weeks after setting out, gave the following data:—

	<i>Treated Plant.</i>	<i>Untreated Plant.</i>
Height above soil	12 in.	9 in.
Depth of root system	5 in.	3½ in.
Condition of roots	White and sappy	Dry and brown
Width of washed root system ..	3½ in.	2 in.
Av. distance between leaves ..	1½ in.	1¼ in.
Thickness of stem	5/12 in.	3/12 in.

Treatment after Planting.—Experiments made in 1933 showed that symphyliids at the roots of tomato plants could be destroyed by applications of diluted carbon bisulphide solution, but that, as the effects of the treatment passed off, fresh infestation might take place. This indicated that several applications at frequent intervals would be necessary to enable the plants to build up an adequate root system. The tests were repeated in 1934, using the emulsion at a strength of 1 in 120 and applying a half-pint to the soil about 2 in. from the plant. When applied in this manner, the solution did not touch the stem of the plant directly but soaked the area about the roots. This treatment was found to destroy the symphyliids, and three applications, at weekly

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intervals, allowed the plants to become well established. One important observation made during the tests was that injury to the plants after treatment with carbon bisulphide emulsion only occurred when the plants had been damaged at, or previous to, planting, and where the stem tissue at the ground level was crushed.

Treatment after planting is less convenient and more costly than treatment before planting, and should only be used where infestation is not discovered until after the plants are put in, and where local infestation has taken place after pre-cropping treatment.

Recommendations.—Where glasshouses are infested with symphyliid *Scutigerella immaculata* Newport, the following measures are likely to give satisfactory control of the pest. Thorough preparation of the soil between crops should be part of the usual routine, and rototiller cultivation is likely to be found highly satisfactory. Such treatment breaks down established soil crevices and hinders the movement of the symphyliids in the soil.

Care should be taken that the plants to be set out in infested soil have well-developed root systems. Tomato plants should be boxed at least twice, and plenty of space, at least 9 sq. in., should be given to each plant at the second boxing. Lettuce plants should be pricked out 2 in. by 2 in. before final planting, and then set out with care to avoid injury to the roots and the collar of the plant.

Carbon bisulphide emulsion may be used in the preparation of the soil for late indoor lettuce and for tomatoes. Probably two applications will be advisable: one at a strength of 1 in 60, applied to the sub-soil when trenching; and the second at 1 in 100 applied to the surface after the trench has been filled in. The rate of application is one gal. of diluted solution per sq. yd. of sub-soil and two gal. per sq. yd. on the surface. The emulsion can be added to the water tank and applied by hose, or it can be applied with a can and rose if desired, although this is a slower process. In a small house, the trenching treatment can be completed throughout the house before the surface application is made. The cost of the treatment, apart from the labour involved, is approximately 13s. per 100 sq. yds. of soil.

Certain precautions⁸ are advisable when using carbon bisulphide as a soil fumigant. Although the substance is

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non-inflammable at the dilutions recommended, the concentrated emulsion is highly inflammable and smoking must not be allowed when the material is being handled, neither should a naked flame be brought into the houses during the process of treatment. When the solution is being applied, the heat should be turned off in the house and all doors and ventilators opened wide to ensure adequate ventilation.

When used carefully as described, carbon bisulphide emulsion is likely to prove of great value in controlling one of the most serious of soil pests under glass.

ACKNOWLEDGMENTS.—The authors desire to record their indebtedness to Mr. N. J. Macpherson, Lecturer in Horticulture, Lancashire County Council, for much assistance during the course of the investigations; and to Mr. R. H. Clayton, M.Sc., of the Manchester Oxide Company, who arranged for the supplies of carbon bisulphide emulsion used in the experiments. They are also grateful to those growers who gave facilities for observation and experiment.

REFERENCES.

- ¹ Theobald (1912): Journ. S.E.A.C., Wye, No. 21, p. 185.
- ² Miles (1926): Monthly Repts., Path. Lab., Min. of Agric. (March).
- ³ Walton (1930): Long Ashton Ann. Rept., p. 76.
- ⁴ Williams (1907): Proc. Boston Nat. Hist. Soc., XXXIII, p. 461.
- ⁵ Feytaud (1926): Rev. Zool. Agric. et App., XXV, Nos. 1 and 2.
- ⁶ Filinger (1931): Ohio Agric. Exp. Sta., Bull. No. 486.
- ⁷ Kearns & Walton (1932): Long Ashton Ann. Rept., p. 97.
- ⁸ Factory Dept., Home Office (1934): Form 836. Memo. on use of Carbon bisulphide, pp. 1-7.

NOTE.—Since this article was written, *The Greenhouse Symphylid* has also been reported upon by Dr. E. R. Speyer, of the Cheshunt Experimental Station (see 20th Annual Report of the Station, 1934, pp. 72 *et seq.*).

THE COMPOSITION OF DRAW-MOSS

BRYNMOR THOMAS, M.Sc., A.I.C.

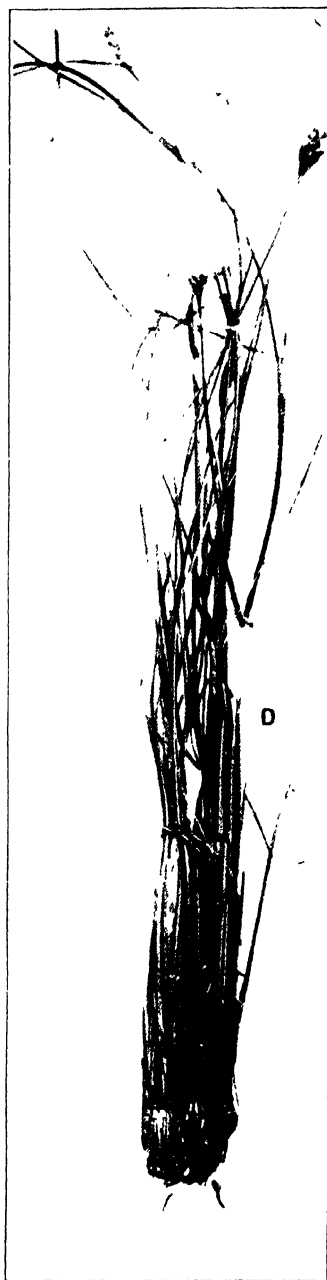
Armstrong College, Newcastle-upon-Tyne.

DRAW-MOSS or Sheathing Cotton Grass (*Eriophorum vaginatum*, Linn.), a moorland plant widely distributed over the northern hemisphere, and commonly found at fairly high altitudes in this country, plays an extremely important part in the nutrition of hill sheep stocks. Even when upland grazing land is predominantly heather moor, small areas of draw-moss carried on deep wet peat are invaluable during early spring. There is little competition between heather and draw-moss, for the latter grows best under very wet conditions. Although it may continue to exist when the surplus water is removed, the character of the plant changes, it assumes a tufty habit of growth and is said to be of inferior feeding value. Further, the wetter the land, the earlier does spring growth begin. For these reasons, the draining of draw-moss land must be undertaken with care. Wallace¹* recommends that "the land must be dry enough to allow sheep to pass freely on to it, and no drier." The same writer adds: "Many a man has ruined his farm, his stock, and himself, by draining such places not wisely but too well." This latter opinion affords some indication of the economic importance of draw-moss to the hill sheep farmer.

In a good year the plant may be fit for use in January, when the long leaf-bases or "scallions," which are white in colour and exceedingly palatable, are drawn and consumed. The high nutritive value of this feed, available at a particularly critical period of the year, is generally recognized by shepherds. Turnbull² has stated that when sheep are lean from the effects of a severe winter, nothing will bring them round more quickly than a supply of draw-moss. The effects of a backward season in which the draw-moss is not fit until March or early April, or of a hard spring frost which will not allow the scallions to be drawn, are correspondingly adverse.

Whether the value of draw-moss is due wholly to its timely availability during a difficult period of the year, or in some part to feeding qualities exceptional in moorland plants, is uncertain. The second view appears to be

* For references, see page 461.



Reproduced from Robert Wallace's "Heather and Moor Burning for Grouse and Sheep," by permission of Messrs. Oliver and Boyd

FIG. 1 Draw moss (*Enophorum vaginatum*, Lam.)

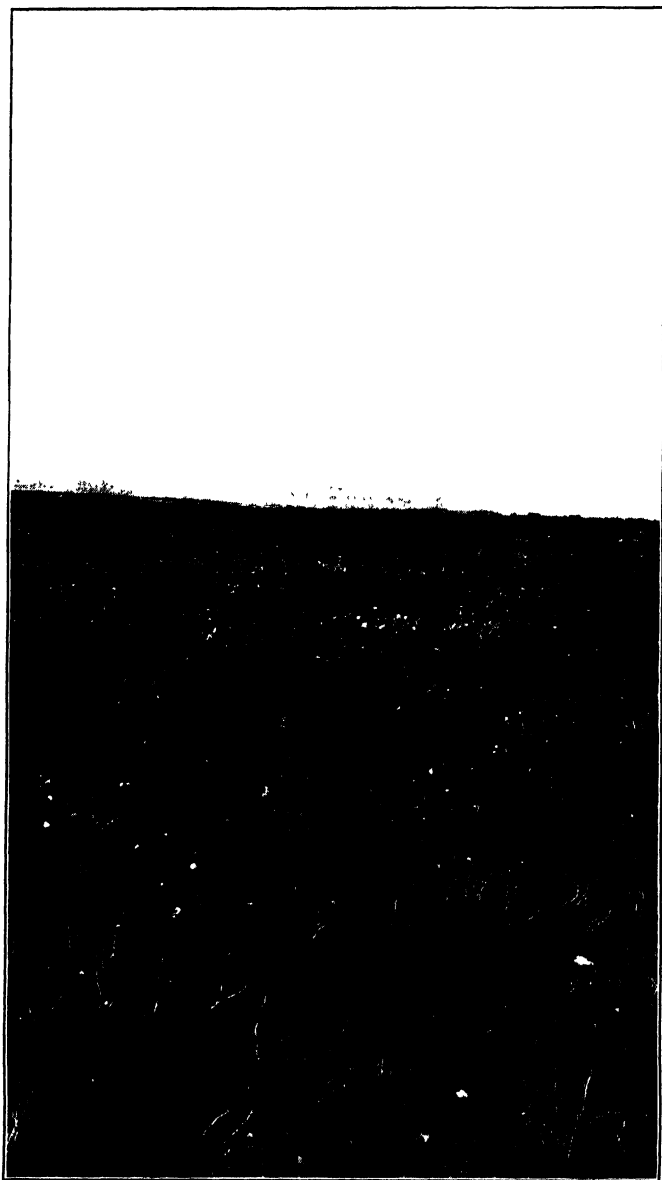


Photo B Thomas

FIG. 2. A patch of Draw-moss at Blanchland, Northumberland

THE COMPOSITION OF DRAW-MOSS

widely held, although there is little good evidence to support it. It was the object of the investigation described below to obtain information on this point, to determine whether the scallion differs materially in composition from the green leaf, and to ascertain the changes in feeding value which may occur as summer approaches.

The author was indebted to Mr. Jasper Stephenson for samples taken from his farm of Newbiggen, at Blanchland in Northumberland. The nature of the hill grazing on this farm has been adequately described elsewhere.^{3 4} Although the land is predominantly "dry moor" carrying short, well-managed heather, scattered areas of deeper peat occur and provide favourable conditions for the growth of draw-moss.

Single samples, each of about 700 grms., were taken on April 5 and June 20, 1933, and immediately despatched to the laboratory. Approximately one-third of each sample was dried as received; the bleached leaf-bases were separated from the remainder and the green portions of the plant discarded. The sample of June 20 included the cotton-like flowering heads.

After drying to constant weight under the usual conditions, the samples were ground in a power mill. As had been anticipated, the scallion showed a relatively low dry-matter content; that of April 5 contained 23.6 per cent. as against 40.4 per cent. for the whole sample received. The amount of calcium present was too small to allow of accurate determination by the usual means, and a micro method was employed. For all other constituents, the usual analytical methods were adequate. The results obtained are shown below.

TABLE I.—PERCENTAGE OF DRY MATTER.

	April 5.		June 20.	
	Whole sample.	Scallion.	Whole sample.	Scallion.
*Crude Protein ..	10.92	11.79	10.29	9.31
Ether Extract ..	1.12	1.31	2.22	2.12
Fibre ..	29.56	28.60	30.09	31.99
**Ash ..	3.16	4.70	3.31	3.56
*Including True Protein	9.11	9.65	9.23	9.17
**Including Phosphoric Acid (P ₂ O ₅) ..	.642	.937	.672	.703
Lime (CaO) ..	.138	> .010	> .010	.015
Percentage solubility of crude protein in pepsin-HCl solution at 38° C. (Wedemeyer) ..	45.42	67.18	51.89	49.19

THE COMPOSITION OF DRAW-MOSS

In the sample of April 5, the scallion is shown to be markedly richer in nitrogen than the plant as a whole, and to have a digestibility which is nearly 50 per cent. greater. This superiority is no longer apparent in June, the scallion being then inferior to the aerial parts both in respect of amount and digestibility. Approximately, 18 per cent. of the total nitrogen in the April scallion is in the non-protein condition, the true protein being little higher than in June. The second sample, when considered as a whole, shows a slightly higher true protein content.

The percentage of fibre present does not appear to vary significantly as between the scallion and the whole plant, while it is not affected by advancing age. A well-marked increase in ether extract is to be observed in the June sample, but it is improbable that significance can be attached to the small differences between scallion and green leaf in respect of this constituent.

There is no evidence of seasonal effect on the total ash content, but in both samples the scallion shows a higher figure than the remainder of the plant. The ash constituents have given results of outstanding interest; while the amount of phosphoric acid in all of the samples is unexpectedly high, in the spring scallions it approximates to that in pasture grass of the highest quality. The June sample, though still comparatively rich in phosphoric acid, contains slightly less than the foregoing. The lime content of both samples is exceedingly low. Particularly is this so in the April scallions; in June the green leaf and stem is inferior to the scallion, but the amount of lime present in the latter remains negligible from the nutritional standpoint.

One analysis of draw-moss made by Kinch¹ shows close agreement in total ash and fibre with the figures recorded above, but the crude protein content on a dry matter basis amounts to 13.75 per cent., while the ether extract is low (0.70 per cent.). There is no record that the ash constituents were determined.

As heather and draw-moss are the predominantly useful plants on any moors, it may be well to compare them from the standpoint of probable nutritive value. From the results obtained in some preliminary investigations of *Calluna*,⁴ it is evident that the crude protein content of the edible portions of the plant, irrespective of age, is little less than in draw-moss. The fibre content of the latter is, however, markedly higher, and may be presumed to affect the

THE COMPOSITION OF DRAW-MOSS

digestibility of the other constituents. The most important differences are to be observed in the amounts of phosphoric acid and lime present. Heather, of any age over two years, appears to be seriously deficient in phosphates, whilst the lime content is only slightly less than in good pasture grass. Draw-moss has an exceptionally high phosphate content, and very little lime. Further, it has been shown that these differences are accentuated in early spring, when draw-moss is of highest nutritive value, and heather is poor and but little eaten. The high phosphoric acid content of the leaf-bases or scallions of draw-moss, though not necessarily the only factor concerned, must therefore be considered to play an important part in the usefulness of the plant as a spring feed for hill sheep.

REFERENCES.

- ¹ Wallace, R. and Kinch, E. *Trans. Highland and Agric. Soc. of Scotland* (1884), 4th Series, 16, 258 and 277.
- ² Turnbull, W. S. *Scottish Farmer*, March 25, 1933.
- ³ Pawson, H. C. (1933) *Jour. Min. Agric.*, 40, 809.
- ⁴ Thomas, B. (1934) *Jour. Agric. Sci.*, 24, 151.

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACTS, 1934 AND 1935

NUMBER, WEIGHT AND PRICES OF CATTLE CERTIFIED FOR PAYMENTS

IN this JOURNAL for May, 1935, information was given regarding the cattle and carcasses of cattle certified for payments under the Cattle Industry (Emergency Provisions) Act, 1934, during the first six months of the Scheme. Similar information is now available for the three months March to May, 1935, and in this article the particulars for these months are set out on similar lines to those previously published. As mentioned in the previous report, the classes of cattle in respect of which payments are made are steers, heifers and cow-heifers; a cow-heifer is defined as an animal which has calved and which has grown not more than six permanent incisor teeth. The standard required from September 1 to December 31, 1934, was that an animal should have an estimated killing-out percentage of not less than 52 per cent. and from January 1, 1935, a killing-out percentage of not less than 54 per cent.

Numbers of Cattle Certified.—The numbers of cattle certified in the United Kingdom as given in the earlier report, have been slightly revised, and the following table shows the numbers of each class of cattle certified in the three months ended May 31, 1935, together with revised figures for the first six months of the Scheme:—

	<i>Steers.</i> No.	<i>Heifers.</i> No.	<i>Cow-heifers.</i> No.	<i>Total.</i> No.
September, 1934 ..	62,104	49,534	3,792	115,430
October, 1934 ..	69,276	58,462	4,592	132,330
November, 1934 ..	58,403	50,728	4,130	113,261
TOTAL: September to November	189,783	158,724	12,514	361,021
December, 1934 ..	63,638	51,083	3,832	118,553
January, 1935 ..	82,098	51,872	4,953	138,923
February, 1935 ..	77,696	41,212	4,421	123,329
TOTAL: December to February	223,432	144,167	13,206	380,805
March, 1935 ..	86,642	39,582	4,616	130,840
April, 1935 ..	102,719	40,898	4,809	148,426
May, 1935 ..	96,609	36,812	4,644	138,065
TOTAL: March to May	285,970	117,292	14,069	417,331
TOTAL for 9 months	699,185	420,183	39,789	1,159,157

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The rate of marketing of fat cattle from month to month, as indicated by the above figures, must be judged with some reserve on account of the fact that the great majority of fat stock markets are held on the earlier days of the week. The increased sales in January and February, to which attention was drawn in the previous report, were continued during the next three months and the number of fat cattle marketed in March, April and May was appreciably higher than in either of the previous three-monthly periods. There was an increase of nearly $5\frac{1}{2}$ per cent. in the three winter months as compared with the three autumn months, and an increase of over $9\frac{1}{2}$ per cent. in the spring period as compared with the winter period. In March to May the numbers marketed were more than $15\frac{1}{2}$ per cent. greater than in September to November.

As regards animals certified at Live-weight Certification Centres, which accounted in the three months March to May, 1935, for 406,904 of the total of 417,331 animals certified at both Live-weight and Dead-weight Centres, details of the numbers of each class of animal certified in each of the agricultural divisions into which the country is divided are given in the table on page 467. During the three months March to May, 1935, 262,475 cattle were certified in England, or $64\frac{1}{2}$ per cent. of the total certified in the United Kingdom; 16,998 cattle, or $4\frac{1}{4}$ per cent., in Wales; 95,120 cattle, or $23\frac{1}{4}$ per cent., in Scotland; and 32,311 cattle, or 8 per cent., in Northern Ireland. The percentage for England was the same as in the six months September to February, that for Wales declined from $7\frac{1}{2}$ per cent. to $4\frac{1}{4}$ per cent., while those of Scotland and Northern Ireland increased from $21\frac{1}{2}$ per cent. to $23\frac{1}{4}$ per cent. and from $6\frac{1}{2}$ per cent. to 8 per cent. respectively.

The information for the spring quarter which is now available makes it possible to continue further the examination of the variations between the numbers of fat cattle placed upon the markets in the different agricultural divisions at different seasons of the year. The north-eastern division of England (Norfolk, Lincoln and the East Riding of Yorkshire), which showed heavily increased marketings in the winter as compared with the autumn, increased its marketings in the spring by over 90 per cent. compared with the winter, and there were two and a half times as

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many fat cattle marketed in this division in the spring as in the autumn. The eastern counties of England also showed an appreciable increase in the spring, but there was relatively little change in other parts of England except in the east-midland division, which showed a decrease of over 25 per cent. in the winter as compared with the autumn quarter, and a further decrease of 28 per cent. in spring as compared with winter. On the eastern side of Scotland and also in Northern Ireland marketings showed progressive increases in each quarter, but the winter increase in Wales was not maintained in the spring.

The relative numbers of fat steers and heifers sold showed comparatively little variation from month to month from September to December, 1934, when heifers accounted for between 43 and 45 per cent. of the certified cattle and steers for between 51½ and 54 per cent. By the end of February, however, the proportion of heifers had decreased to 33½ per cent. and steers had increased to 63 per cent., and the proportion of heifers continued to decline until, in May, there was a slight movement in favour of heifers. The proportion of cow-heifers has remained steady at between 3 and 4 per cent. The following table shows the percentages of each class of cattle certified in the three months March to May:—

			<i>Steers</i> <i>Per cent.</i>	<i>Heifers</i> <i>Per cent.</i>	<i>Cow-heifers</i> <i>Per cent.</i>
March, 1935	..	..	66.2	30.3	3.5
April, 1935	..	..	69.3	27.5	3.2
May, 1935	..	..	68.5	28.1	3.4

The detailed table on p. 467 shows that, as in the previous six months, much the larger proportion of the cattle fattened in the eastern, north-eastern and east-midland divisions of England, in North Wales, in all parts of Scotland and in Northern Ireland, were steers; whilst the northern division of England, in which considerably more heifers than steers were fattened in the grass season, showed a large preponderance of steers in the three months March to May.

The number of animals certified at Dead-weight Centres in the first six months of the Scheme was 16,914, of which 13,938 were certified in England and Wales and 2,976 in Scotland. The numbers certified in the three months March to May were as follows:—

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	<i>England and Wales</i>	<i>Scotland</i>	<i>Great Britain</i>
	<i>No.</i>	<i>No.</i>	<i>No.</i>
March, 1935 - -	3,104	430	3,534
April, 1935 - -	2,738	453	3,191
May, 1935 - -	3,175	527	3,702
Total for three months	9,017	1,410	10,427

Average Weight of Fat Cattle.—The average live weight at which fat cattle were marketed over the first six months of the Scheme was 9 cwt. 2 qr. 8 lb. The average weight over the three months March to May was 9 cwt. 2 qr. 4 lb., and over the whole nine months 9 cwt. 2 qr. 6 lb. In March, 1935, the average was 9 cwt. 2 qr. 8 lb., in April 9 cwt. 2 qr. 6 lb., and in May 9 cwt. 1 qr. 26 lb. The following are the details of the average weights in each country:—

	<i>Average weight over 6 months September, 1934, to February, 1935</i>	<i>Average weight over 3 months March to May, 1935.</i>	<i>Average weight over 9 months September, 1934, to May, 1935.</i>
	<i>cwt. qr. lb.</i>	<i>cwt. qr. lb.</i>	<i>cwt. qr. lb.</i>
England and Wales	9 2 10	9 2 7	9 2 9
Scotland - -	9 3 2	9 3 12	9 3 6
Northern Ireland -	8 2 14	8 1 14	8 2 1
United Kingdom •	9 2 8	9 2 4	9 2 6

The dressed carcass weights of the animals certified at Dead-weight Centres averaged 601 lb. over the first six months of the Scheme, 622 lb. over the three months March to May, 1935, and 609 lb. over the whole nine months, details being as follows:—

	<i>Average weight over 6 months September, 1934, to February, 1935</i>	<i>Average weight over 3 months March to May, 1935.</i>	<i>Average weight over 9 months September, 1934, to May, 1935.</i>
	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>
England and Wales	598	621	607
Scotland - -	617	631	621
Great Britain -	601	622	609

Average Prices of Fat Cattle.—The prices of fat cattle, which were declining in January and February, 1935, continued to fall until the end of March and then began to rise steadily. The average prices of certified cattle, as given in the first report, fell from 37s. 9d. per live cwt. over the United Kingdom in September, 1934, to 34s. 3d. in February, 1935, with an average of 35s. 7d. over the six months. Average prices of certified cattle were lower in March and April, 1935, than in February, but there was a

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sharp increase in May which brought prices back to about the January level. Average prices per live cwt. for the three months March to May were as follows:—

		<i>England and Wales.</i>	<i>Scotland</i>	<i>Northern Ireland.</i>	<i>United Kingdom.</i>
		<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
March, 1935	.. ..	33 5	36 1	29 10	33 9
April, 1935	.. ..	33 11	36 0	29 8	34 2
May, 1935	.. ..	35 5	37 5	30 11	35 7
Average for three months (March to May, 1935)	.. ..	34 4	36 8	30 3	34 7
Average for nine months (September, 1934, to May, 1935)	.. ..	34 8	38 0	30 9	35 2

The average price per cwt. dressed carcass weight of the cattle certified on a dead-weight basis over the first six months was 63s. 4d. Over the three months March to May, 1935, the average was 59s. 1d., and over the whole nine months 61s. 8d. Average prices per cwt. dressed carcass weight in March, April and May were as follows:—

		<i>s. d.</i>
March, 1935	.. ..	59 1
April, 1935	.. ..	57 9
May, 1935	.. ..	60 0
Average for three months (March to May, 1935)	.. ..	59 1
Average for nine months (September, 1934, to May, 1935)	.. ..	61 8

For the reason mentioned in the previous report (i.e., the lapse of time between the sale of a carcass and the date of receipt of the certificate by the Cattle Committee) the movements in prices of cattle certified on a dead-weight basis are not reflected as quickly as the movements in the prices of live animals. Thus, the rise that occurred in the case of live animals in April, is not, in the case of carcasses, reflected until May.

The Agricultural Divisions comprise the Counties of:—

ENGLAND—

EAST: Bedford, Huntingdon, Cambridge, Suffolk, Essex, Hertford, Middlesex and London.

NORTH-EAST: Norfolk, Lincoln and York, East Riding.

SOUTH-EAST: Kent, Surrey, Sussex, Berkshire and Hampshire.

EAST MIDLAND: Nottingham, Leicester, Rutland, Northampton, Buckingham, Oxford and Warwick.

WEST MIDLAND: Salop, Worcester, Gloucester, Wiltshire and Hereford.

SOUTH-WEST: Somerset, Dorset, Devon and Cornwall.

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NUMBER OF CATTLE CERTIFIED FOR PAYMENT UNDER THE CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACTS
AT LIVE-WEIGHT CENTRES IN EACH MONTH FROM MARCH TO MAY, 1935.*

AGRICULTURAL DIVISION	STEERS			HEIFERS			COW-HEIFERS			TOTAL	
	March	April	May	March	April	May	March	April	May	April	May
East ...	4,845	6,007	6,572	2,292	2,487	2,542	111	102	124	8,596	9,238
North East ...	15,106	18,547	20,016	2,891	3,648	3,522	192	162	178	22,357	23,716
South East ...	1,644	2,174	1,885	1,753	2,028	1,716	141	176	121	3,538	3,722
East Midland ...	4,849	5,033	4,413	2,568	2,268	2,402	269	259	296	7,660	7,411
West Midland ...	4,845	5,941	4,940	4,115	4,385	3,724	344	410	357	9,304	9,021
South West ...	4,188	4,709	4,593	3,615	3,238	3,175	820	836	898	8,783	8,666
North ...	12,243	14,361	13,214	5,088	5,220	4,299	683	761	679	20,342	18,192
North West ...	3,550	4,290	3,989	4,286	4,492	3,679	1,043	1,116	1,010	9,898	8,678
TOTAL ...	51,270	61,062	59,622	26,608	27,766	25,059	3,603	3,822	3,663	92,650	88,344
Wales (including Monmouth)	2,114	1,803	909	855	810	433	67	80	46	2,693	1,388
South ...	2,113	1,828	1,373	1,612	1,328	1,071	218	164	174	3,320	2,618
TOTAL ...	4,227	3,631	2,282	2,467	2,138	1,504	285	244	220	6,013	4,006
North East ...	5,053	5,854	6,247	3,977	4,432	4,464	87	80	94	10,366	10,805
East Central ...	6,814	9,438	8,852	1,477	1,693	1,538	32	45	41	11,176	10,431
South East ...	4,181	5,426	4,526	263	380	253	9	19	11	4,453	4,590
West & South-West ...	3,991	4,326	3,864	1,152	1,129	918	168	180	200	5,311	4,982
North & North-West ...	790	902	898	534	454	484	17	14	13	1,370	1,395
TOTAL ...	20,829	25,946	24,187	7,403	8,088	7,657	313	338	359	34,372	32,203
Northern Ireland Total ...	7,862	9,666	7,614	2,161	2,226	1,927	278	308	269	12,200	9,810
TOTAL UNITED KINGDOM ...	84,188	100,305	93,705	38,639	40,218	36,147	4,479	4,712	4,511	145,235	134,363

*Details of the monthly figures from September 1, 1934, to February 28, 1935, are given on pages 144 and 145 of the JOURNAL for May, 1935.

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NORTH: Northumberland, Durham and York, North and West Ridings.

NORTH-WEST: Cumberland, Westmorland, Lancaster, Chester, Derby and Stafford.

WALES—

NORTH: Anglesey, Caernarvon, Merioneth, Montgomery, Denbigh and Flint.

SOUTH: Cardigan, Radnor, Brecon, Monmouth, Glamorgan, Carmarthen and Pembroke.

SCOTLAND—

NORTH-EAST: Nairn, Moray, Banff, Aberdeen and Kincardine.

EAST CENTRAL: Angus, Perth, Fife, Clackmannan and Kinross.

SOUTH-EAST: West Lothian, Midlothian, East Lothian, Berwick, Roxburgh, Selkirk and Peebles.

WEST AND SOUTH-WEST: Argyll, Bute, Dumbarton, Stirling, Lanark, Renfrew, Ayr, Dumfries, Kirkcudbright and Wigtown.

NORTH AND NORTH-WEST: Zetland, Orkney, Caithness, Sutherland, Ross and Cromarty, and Inverness.

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Milk Marketing Scheme.—*Poll on the Question of Revocation.*—Considerable publicity has been given to the demand which is being made in some quarters for a poll to be taken on the question whether the scheme should be revoked. The scheme provides that such a poll may be demanded at any time by at least 500 registered producers. The Agricultural Marketing Act, 1931, however, stipulates that a poll on the question whether or not a scheme shall be revoked may not, without the consent of the marketing board concerned, be taken within a period of two years following the date on which the scheme came into full operation. In the case of the Milk Marketing Scheme, this period expires on September 5, 1935. The Milk Board have announced that, a demand having been made by the requisite number of registered producers, a poll on the question of revocation will be taken early in August, without waiting for the expiry of the two-year period. The "qualifying date" will be August 1, and every producer whose name is on the Board's register at noon on that date will be entitled to vote. Voting papers should be received by producers on August 3, and will be returnable on or before August 15.

The Minister of Agriculture and Fisheries, speaking at Yeovil on July 11, said:—

"The Board have decided that if a poll is wanted, a poll shall be held; and the sooner the better, so that contracts for the next dairy year are not discussed in an atmosphere of uncertainty. Their decision, I think, is wise from a business standpoint, and it is thoroughly in accordance with both the spirit and the letter of the Agricultural Marketing Acts.

Let me make it clear, as I have done on a previous occasion, that if producers wish to scrap any of the Schemes and Boards, the Government will not stand in their way.

But before producers deliver their judgment on the Milk Board there are certain questions which I think they should put frankly to themselves in their own interests.

These are some of the points which they should carefully consider. First, since 1931 a quarter of a million cows have been added to the dairy herds of this country. What are we going to do, the day after the vote, with that quarter of a million? In the first five months of this year 58 million more gallons of milk have been put on the market in England and Wales as against the same period of 1934. What is going to be the position for the second five months of 1935, and what are we going to do about that milk, the day after the vote? Who are we going to sell that milk to, the day after the vote, and for those of us who can sell our milk how long will it be before the surplus milk from elsewhere comes to flood our markets? Are we sure of getting a profitable price if we are thrown back on our own resources and have to compete more and more keenly with each other to find a buyer? To abolish the Board would not transfer a single gallon of milk from the manufacturing to the liquid market."

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Pool Prices for June, 1935.—The wholesale "liquid" price for June was 1s. 0d. per gallon in all regions, and was the same as in the preceding month (excluding publicity contribution) and in the month of June, 1934. Pool prices and rates of producer-retailers' contributions are given below:—

Region	Pool Prices (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	June 1935	May 1935	June 1934	June 1935	May 1935	June 1934
Northern ..	9½	9½	10½	2½	2½	1½
North-Western ..	9½	9½	10½	2½	2½	1½
Eastern ..	10	9½	10½	1½	2½	1½
East Midland ..	9½	9½	10½	2½	2½	1½
West Midland ..	9½	9	9½	2½	2½	1½
North Wales ..	9½	9½	10	2½	2½	1½
South Wales ..	9½	9½	10½	2½	2½	1½
Southern ..	10	9½	10½	1½	2½	1½
Mid-Western ..	9½	9	10	2½	2½	1½
Far-Western ..	9½	9	10	2½	2½	1½
South-Eastern ..	10½	10	10½	1½	1½	1½
Unweighted Average	9.57	9.41	10.25	2.14	2.32	1.56

Producer-retailers who qualified were credited with level delivery premiums at the rate of ½d. per gallon. Accredited producers received a premium of 1d. per gallon in addition to the pool price. No levy was made for general expenses.

Estimated sales on wholesale contracts were as follows:—

		June, 1935 (estimated)	June, 1934
Liquid	46,002,486 gal.	44,549,667 gal.	
Manufacturing	39,895,474 ..	28,632,875 ..	
Total ..	85,897,960 ..	73,182,542 ..	
Percentage Liquid Sales ..	53.6	60.9	
„ Manufacturing Sales ..	46.4	39.1	

The average realization price of manufacturing milk during June was 5.13d. per gallon, a slight increase on the previous month, when the price was 5.01d. per gallon. Milk manufactured into cheese by farmhouse cheesemakers amounted to 2,250,631 gallons, compared with 2,187,364 gallons in May, and 3,673,455 gallons in June, 1934.

Bacon Development Scheme.—After consideration of the draft scheme, and of objections and representations lodged with respect thereto, the Minister of Agriculture and Fisheries and the Secretary of State for Scotland have made modifications in the scheme with the assent of the Pigs and Bacon Marketing Boards. Special meetings of the registered producers under both marketing schemes have approved the draft scheme as modified, and the Minister

MARKETING NOTES

and the Secretary of State, after consulting the Board of Trade, have laid the draft before Parliament.

Pigs and Bacon Marketing Schemes: Pig Prices for July.—Contract prices for bacon pigs showed a further increase for July, the price for a basic pig (i.e., Class I, Grade C) being 11s. 9d. per score, compared with 11s. 5d. for June and 10s. 11d. for May. Despite a slight fall in the price of the standard feeding-stuffs ration, the pig price rose on account of an increase in the ascertained bacon price from 90s. 10d. to 95s. 5d. per cwt. The basic price is exclusive of the curers' contribution of 1d. per score towards insurance.

Committee of Investigation: Complaint regarding Insurance of Pigs.—The Committee of Investigation for Great Britain appointed by the Minister of Agriculture and the Secretary of State for Scotland under Section 9 of the Agricultural Marketing Act, 1931, have reported on a complaint by the Parliamentary Committee of the Co-operative Congress regarding the omission of the Pigs Marketing Board to provide for the compulsory insurance of pigs sold under contract by registered pig producers to registered bacon curers.

After considering the evidence and arguments submitted to them, the Committee found that:—

- (i) a system of uniform insurance is essential for the stability and well-being of the pig industry as a whole;
- (ii) the omission of the Pigs Marketing Board to prescribe compulsory insurance is contrary to the interests of the complainants, is not in the interest of the industry as a whole and is not in the public interest.

The Minister and the Secretary of State have accordingly requested the Pigs Marketing Board to prepare, in consultation with the Bacon Marketing Board and other interests concerned, a scheme for the insurance of all pigs consigned to registered bacon curers under contract after December 31, 1935.

The Pig Industry Council for Northern Ireland.—Marketing boards for pigs and bacon were established in Northern Ireland in September, 1933, by marketing schemes framed by the Minister of Agriculture for Northern Ireland under the Agricultural Marketing Act (Northern Ireland), 1933. The Act requires the schemes to be submitted to Parliament for confirmation within two years of their initiation, and the Pigs Marketing Scheme was so submitted and confirmed in June, 1935.

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In the meantime, further legislation has been passed providing for the constitution of a body which, broadly speaking, fills in Northern Ireland the rôle of the proposed Bacon Development Board for Great Britain. The Pig Industry Council for Northern Ireland, consisting of three members (including the Chairman, Sir Dudley E. B. McCorkell, M.B.E.) appointed by the Minister of Agriculture, three members appointed by the Bacon Marketing Board and three members appointed by the Pigs Marketing Board, held its first meeting on March 20.

The Agricultural Marketing (Pig Industry) Act, (Northern Ireland), 1934, under which the Council has been constituted, empowers the Ministry of Agriculture to regulate the production of bacon in Northern Ireland by determining the quantity and description of bacon which may be produced by licensed curers within the meaning of the Agricultural Produce (Meat Regulation) Act, 1930. Curers licensed before November 1, 1934, may not have their output reduced below the quantity produced in the twelve months preceding that date, provided that the same quantity was produced in the "relevant year," i.e., the twelve months preceding the date of any determination.

All applications for new licences are to be referred to the Pig Industry Council. If the Council report against the application, with the object of avoiding or reducing excessive production of bacon, the Ministry may refuse a licence; and if the Council advise the attachment of conditions in order to promote efficient production, the Ministry may attach such conditions. The Council also determines the prices at, below or above which, and the terms on which pigs, or any description of pigs may be sold by producers, but its determinations are subject to the approval of the Ministry. Moreover, the power of the Pigs Board to sell pigs at such prices and on such terms as the Board may determine remains unaffected.

The Council also advise the Ministry as to the production, marketing and grading of pigs and bacon, and the encouragement of agricultural education and research connected with the production and marketing of pigs and bacon, and as to such other matters as may be referred to the Council by the Ministry. Other provisions of the Act relate to the discharge by the Council of the duties formerly vested in the Pigs Board in connexion with the registration of "protected" contracts, the collection and remission to the Ministry (for transmission to the Pigs Board) by bacon

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curers of levies due by pig producers to the Pigs Board, and the prescription by the Ministry of the persons by whom, the manner in which and the places at which pigs and bacon are to be graded, marked, packed, stored, adapted for sale, insured, advertised or transported. Licensed curers are required to keep such records and to furnish the Ministry or the Council with such returns relating to bacon production, purchases of pigs and sales of bacon (including prices paid and obtained) as may be prescribed by the Ministry.

The fund for the purposes of the Act is administered and controlled by the Ministry and derived from licence fees and contributions paid by the Pigs and Bacon Boards.

Potato Marketing Scheme.—*Census of Acreage.*—Returns furnished to the Potato Marketing Board by about 91 per cent. of the registered producers indicate that the acreage under potatoes this year will be approximately 4.5 per cent. below the 1934 figure.

Contributions by Registered Producers.—The Board have decided to require registered producers to pay contributions under the scheme for 1935 at the same rates as last year, viz., a contribution of 5s. per acre on potato acreage, and a special contribution of £5 per acre on acreage in excess of basic acreage.

Co-option of Member of the Board.—The vacancy caused by the resignation of Capt. the Hon. J. G. Stuart, M.P., has been filled by the co-option of Commander the Hon. A. D. Cochrane, M.P.

Milk Act, 1934.—Advances amounting to £1,140,533 have, to date, been made to the Milk Marketing Board under Section 1 of this Act in respect of milk used for manufacture (excluding milk manufactured by the Board itself or milk used for cheese-making on farms). Particulars are given below:—

Period	Gallons	*Rate of advance per gallon	Advances
April 1934, to Sept. 1934	79,314,983	Varying from 0.25 pence to 1.5 pence	£ 426,267
Oct. 1934, to Mar. 1935	73,496,575	Varying from 1.0 pence to 2.28 pence	571,048
April and May 1935	45,480,314	Varying from 0.5 pence to 0.82 pence	143,218
TOTAL ...	198,291,872	—	1,140,533

* Varies according to month and product.

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Advances to the Board under Section 3 of the Act, in respect of milk manufactured into cheese on farms, now total £109,130, and are as follows:—

Month	Gallons	Rate of advance per gallon	Advances
1934		d.	£
April	2,075,713	1'58	13,665
May	3,149,217	1'60	20,995
June	3,217,642	1'52	20,378
July	2,701,434	1'25	14,070
August	2,523,329	1'17	12,801
September ...	2,232,458	1'14	10,604
October	982,027	2'28	9,329
November ...	296,883	1'96	2,425
December ...	239,872	1'75	1,749
1935			
January	212,420	2'07	1,832
February	178,963	1'77	1,320
March	61,257	1'81	462
TOTAL	17,871,215	—	109,130

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4.0d. per lb. for the month of July.

Milk-in-Schools Scheme.—Payments amounting to £316,344 have been made to date to the Milk Marketing Board under Section 11 of the Milk Act by way of compensation in respect of the Board's expenses in supplying milk to school children at reduced rates. Details are given below:—

Month	Gallons	*Rate of compensation per gallon	Exchequer Payment
1934		d.	£
October	1,967,378	5	40,987
November	2,446,785	5	50,975
December	1,766,301	5½	40,478
1935			
January	2,166,368	5½	49,646
February	2,329,878	5½	53,393
March	2,363,582	5	49,241
April	1,517,964	5	31,624
TOTAL	14,558,256	—	316,344

* One-half of the Board's loss, which is the wholesale price, plus 6d. distribution costs, minus 1s. paid by children.

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Nutritional Survey.—Over 8,000 children in five centres are now included in this investigation, viz.: Luton (1,263), Burton-on-Trent (2,088), Wolverhampton (1,233), Renfrew (1,972), and Huddersfield (about 1,500). It was found impossible to secure a suitable area for research in Wales, and a new centre was accordingly opened at Huddersfield, where a considerable number of children in 8 schools were not participating in the Milk-in-Schools Scheme.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by July 11 to £3,081,658. These payments were in respect of 1,291,582 animals, the average payment per beast being £2 7s. 9d. Since August 6, 1934, some 370,000 animals have been marked at ports (excluding Northern Ireland) under the Marking of Imported Cattle Order.

Extension of the Subsidy Period.—By a Financial Resolution of the House of Commons on July 15 authority was given for the introduction of a Bill which will provide for extending by not more than thirteen months the period during which cattle or carcasses of cattle must have been sold in order that payment in respect thereof may be made to producers of cattle in the United Kingdom out of the Cattle Fund.

The proposed legislation will provide for an extension of the period in the first instance to the end of June, 1936, and it is estimated that the sum which Parliament will be asked to provide in respect of payments to producers and in respect of the administrative expenses of the Cattle Committee and of the appropriate Ministers during the months of October, 1935, to June, 1936, inclusive, will not exceed £3,000,000. It is proposed also to make provision for a further extension for a period not exceeding four months from the end of June, 1936, subject to the specific authority of Parliament. If circumstances should arise which make it necessary for Parliament to be asked to approve such an extension, the further liability on public funds is estimated not to exceed £1,333,000.

It is intended that sums advanced from the Exchequer to the Cattle Fund under the authority of this legislation, including the advances to cover the costs of administration

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and of the appropriate Ministers shall, together with the advances already made, or to be made, under existing legislation, be recoverable in full by the Exchequer, as circumstances may permit, from the proceeds of any levy which may hereafter be collected on imported meat and live stock.

Wheat Act, 1932.—Sales of Home-grown Wheat—Cereal Year 1934-35.—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1934, to July 5, 1935, cover sales of 34,435,038 cwt. of millable wheat, as compared with 27,752,811 cwt. in the corresponding period (July 6) in the last cereal year.

Standard Price Committee.—The Committee appointed last February under the provisions of Section 2 (3) of the Wheat Act, to consider general economic conditions and the conditions affecting the agricultural industry and report to the Ministers concerned as to the desirability of making any alteration in the "standard price" of home-grown wheat, has presented its report, which has been issued as a Command Paper (Cmd. 4932).

The Committee reached the unanimous conclusion that it is undesirable at the present time to make any alteration in the "standard price." The Committee also states that in its opinion the period of three years since the passing of the Wheat Act has proved in practice too short to enable definite conclusions to be reached regarding the future and suggests, therefore, that it might be desirable to contemplate a similar inquiry after a further period.

Advance Payment to Registered Growers.—On July 13, 1935, the Wheat Commission made an advance payment to registered growers at the rate of 3s. per cwt. (13s. 6d. per quarter) in respect of 5,520,000 cwt. (1,227,000 qr.) of wheat vouched for by 28,740 wheat certificates delivered to the Commission between April 6 and June 28, 1935. The aggregate amount of this advance was approximately £828,000, which was paid to 19,900 registered growers.

No advance on account will be made during this cereal year on certificates delivered to the Commission after June 28, 1935. The next payment will be the final payment for the cereal year ending on July 31, 1935, to all registered growers who have delivered valid wheat certificates to the Commission during the cereal year. This payment will probably be made about the middle of September next.

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Sugar Beet.—The British Sugar (Subsidy) Bill, 1935, which provides, with certain modifications, for a continuance of Exchequer assistance to the sugar-beet industry for a further year until August 31, 1936, was given a Third Reading in the House of Commons on July 19, 1935.

Cattle (Import Regulation) Order, 1933.—As from July 17, 1935, and until further notice, store cattle import licences under the Cattle (Import Regulation) Order, 1933, are being issued by the authorized officers of the Ministry of Agriculture and Fisheries or of the Ministry of Agriculture for Northern Ireland, as the case may be, at the point of entry of the cattle into the United Kingdom. As from the above-mentioned date, therefore, it will not be necessary for exporters to forward licences with store cattle for export from the Irish Free State either through a sea port or by rail or road frontier post.

There is no change in the marking regulations regarding store cattle. All such cattle must as heretofore be marked before importation with a broad arrow six inches long clipped on the right hind-quarter. Until further notice import licences will be issued for all store cattle in respect of which the importer or his authorized agent has completed a form of application for licence declaring that each animal is a store beast as defined in the Order, and that it is marked as required by the Order.

Fat cattle, bulls (showing permanent incisor teeth) and dry cows, must on exportation from the Irish Free State continue to be accompanied by a licence for each beast and to be marked in the usual way. Licences in respect of those classes will continue to be distributed by the Irish Free State authorities.

Animals in fat condition but imported as store beasts will be liable to forfeiture by the Customs Authorities as hitherto.

Marketing of Argentine Meat in the United Kingdom.—Paragraph 3 of the Protocol to the Anglo-Argentine Agreement of May 1, 1933, provides that should the Argentine Government or Argentine producers, operating under a special law, own, control or manage undertakings not conducted primarily for private profit, the Government of the United Kingdom will be prepared to license approved importers to import meat from such undertakings up to 15 per cent. of the total quantity imported into the United Kingdom from Argentina, on the understanding that any

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such shipments are "efficiently marketed through normal channels, taking into consideration the necessity of co-ordination of the trade in the United Kingdom." This percentage is to include the imports now permitted from two Argentine frigorificos, the Frigorifico Gualeguaychu and the Buenos Aires Municipal Frigorifico.

Late in 1933 an Act* was passed in Argentina authorizing the establishment of a National Meat Board having wide powers, including that of creating organizations that may be necessary in the interests of the live stock industry. Such an organization, the Corporation of Argentine Meat Producers, was created by the National Meat Board set up under the Act, and the President of the Argentine Republic approved the statutes of the Corporation by decree in October, 1934. The Corporation, composed of livestock producers, is mainly financed from levies collected by the National Meat Board on the sales of live stock. Half the net profits of the Corporation must go to reserve or share redemption funds, and the other half must be distributed amongst the shareholders, who are producers of live stock, or used for the purpose of augmenting meat exports or such other purpose as the shareholders, in general meeting, may decide.

The function of the Corporation of Argentine Meat Producers is to trade in and prepare the main products and by-products of the cattle industry both for home consumption and export, and to strive for the better regulation of the meat trade so as to ensure reasonable returns to producers. In order to assist its operations, the Corporation has been given power to enter into all phases of the meat processing and merchanting industry.

His Majesty's Government in the United Kingdom were recently informed by the Argentine Government that the Corporation had completed its arrangements for the shipment of the balance of the reserved "producers' quota." It is proposed that the meat should be prepared for export and shipped on behalf of the Corporation by the Sansinena Company, Ltd., and the Smithfield and Argentine Meat Company, Ltd., and that it should be distributed in this country by those two companies and by the Co-operative Wholesale Society, Ltd., which have been licensed by the Board of Trade to import meat from Argentina on behalf

* See note in the January, 1934, number of this JOURNAL (pp. 980-2).
"Argentina: Act to create a National Meat Board."

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of the Corporation. The first shipment of meat under these arrangements is expected to arrive in this country about the middle of August.

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during April, May, and June, 1934 and 1935, and the three weeks ended July 20, 1935, were as follows:—

LONDON AREA.							
				<i>Home Killed.</i>	<i>Scotch Sides for London.</i>	<i>Total.</i>	
April, 1934	..	..	..	8,829	6,116	..	14,945
" 1935	..	..	..	11,334	8,391	..	19,725
May, 1934	..	..	..	8,878	6,555	..	15,433
" 1935	..	..	..	11,980	8,153	..	20,133
June, 1934	..	..	..	7,275	6,171	..	13,446
" 1935	..	..	..	9,720	7,064	..	16,784
Three weeks ended July 20, 1935	..	..	..	6,836	4,724	..	11,560

BIRKENHEAD AREA. (Including Liverpool.)

				<i>For London (included under Home-Killed in London Area).</i>	<i>Liverpool (for local requirements).</i>	<i>Total.</i>	
April, 1934	..	..	..	2,194	1,320	..	3,514
" 1935	..	..	..	1,613	1,606	..	3,219
May, 1934	..	..	..	2,214	1,175	..	3,389
" 1935	..	..	..	1,172	1,655	..	2,827
June, 1934	..	..	..	1,462	1,060	..	2,522
" 1935	..	..	..	1,572	1,385	..	2,957
Three weeks ended July 20, 1935	..	..	..	1,158	1,095	..	2,253

BIRMINGHAM AND YORKSHIRE AREAS.

				<i>Birmingham.</i>	<i>Leeds.</i>	<i>Bradford.</i>	<i>Halifax.</i>
April, 1934	..	..	..	4,561	2,341	1,864	536
" 1935	..	..	..	5,216	2,697	1,890	540
May, 1934	..	..	..	4,495	2,157	1,570	440
" 1935	..	..	..	4,995	2,532	1,628	428
June, 1934	..	..	..	3,864	1,939	1,486	406
" 1935	..	..	..	4,119	2,309	1,381	388
Three weeks ended July 20, 1935	..	..	..	2,795	1,761	933	305

Carcass Sales by Grade and Dead-weight.—The Ministry's scheme for the consignment of fat stock from farm to abattoir continues to progress. During the three months ended June 30, 2,608 cattle, 2,786 lambs and sheep, and 1,283 pigs were dealt with at the various grading centres, as compared with 1,242 cattle, 3,302 lambs and sheep, and 243 pigs during the same period of 1934. The number of cattle dealt with under the scheme in January to June, 1935, was 5,525, this number being only 17 fewer than the total number for the year 1934.

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Of the 2,489 bullocks and heifers received under the scheme during the quarter, 2,433 were certified for Cattle Fund payments based on dead-weight sale.

In conjunction with the North Wales Marketing Committee of the National Farmers' Union and the Welsh Agricultural Organization Society, arrangements were completed in June for receiving bulk consignments of lambs and sheep for disposal at Manchester, Liverpool and Birmingham. The scheme will run on the same lines as schemes in operation last year.

Breakfast Foods: National Mark Scheme for Wheat Flakes.—On the advice of the National Mark Wheat Flour, etc., Trade Committee the Ministry is about to formulate a National Mark scheme for wheat flakes made from home-grown wheat, and, as a preliminary step, draft regulations under the Agricultural Produce (Grading and Marking) Acts have been published prescribing a grade designation "Select" and definition of quality as follows:—

DEFINITION OF QUALITY OF SELECT WHEAT FLAKES.

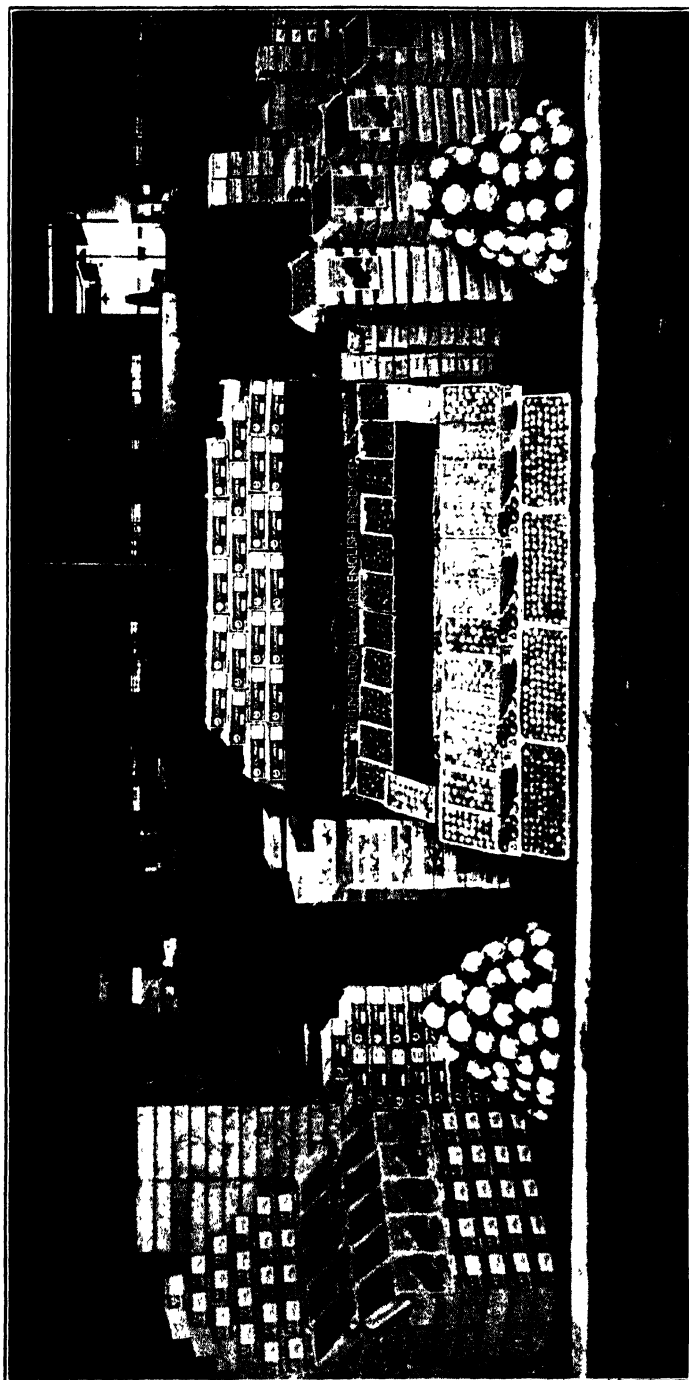
In all cases the Wheat Flakes shall be sound, free from taint and objectionable flavour, mould and staleness, and shall be made exclusively from sound, well-cleaned wheat grown in England and Wales, and in addition shall have the qualities or characteristics specified below:—

<i>Type</i>	<i>Special Characteristics</i>
The wheat flakes shall comprise the whole wheat berry; bran or flour shall not be added to nor extracted therefrom.	The colour of the flakes as packed shall be a clear golden toast colour, but the flakes shall contain no added colouring material. The flakes shall be reasonably free from dust and from small fragments. Any addition of malt and/or sugar shall be declared on the container.

Packers authorized under the scheme will be required to comply with certain requirements in regard to their premises, equipment and records, and will apply the National Mark by incorporation in the printed design on their cartons.

Details of the scheme may be obtained on application to the Ministry.

National Mark Produce at Spitalfields Market.—On the occasion of the recent opening of the new Flower Market of the City Corporation at Spitalfields Market, by the Duke of Kent, a registered distributor of National Mark fruit and vegetables staged a display of National Mark tomatoes and cucumbers, which effectively demonstrated the value of adopting the standardized methods of grading and packing



Inclay by a registered distributor of National Mark fruit and vegetables of National Mark tomatoes and cucumbers at Crystal Palace Market, London, on a display of the recent opening of the new Flower Market there.

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inherent in the National Mark schemes. The display is shown in the accompanying illustration.

Marketing Demonstrations.—The Ministry is exhibiting at the following shows during August. A comprehensive display of National Mark produce and a cinema programme will be included at each show except Sandy:—

Royal Lancashire
(Burnley, Aug. 1-5)

Practical demonstrations of the grading and packing of eggs and tomatoes will be given daily. The Milk and Potato Marketing Boards and the National Milk Publicity Council will be represented.

Denbigh and Flint
(Trefnant, Aug. 15)

The Milk Marketing Board and the National Milk Publicity Council will be represented.

Southport Flower
(Southport, Aug. 28-30)

A practical demonstration of the grading and packing of eggs will be staged. The National Milk Publicity Council will be represented.

Sandy and District
(Sandy, Aug. 29)

The exhibit will be confined to National Mark vegetables.

National Mark Products: Competitions at Forthcoming Exhibitions and Shows.—The following particulars of competitions arranged by the Ministry in connexion with certain forthcoming shows and exhibitions are supplied for the information of National Mark packers, producers and others who may be interested.

Vegetables.—Sandy and District Floral and Horticultural Show, Sandy, Beds., on August 29. A class, open to all commercial vegetable growers in England and Wales, for collection of vegetables in market packages—one package, consisting of any 5 of 10 specified kinds and grades, packed in accordance with the statutory grade requirements specified in the Ministry's Marketing Leaflet No. 58. Particulars and entry form from the Secretary, Sandy Show, Sandy, Beds. Prizes to be awarded are:—1st, £5; 2nd, £3; 3rd, £2; 4th, £1.

Flour.—Bakers', Confectioners' and Allied Traders' Exhibition, Royal Agricultural Hall, London, September 7 to 13. A class confined to authorized millers of National Mark flour for flour milled solely from Yeoman wheat grown in England and Wales. One bag of 14 lb. and three bags of 7 lb. each; also a 2-lb. bag of the wheat used. Closing date for entries—August 27. Particulars from Mr. H. S. Rogers, 11, Queen Victoria Street, London, E.C.4.

Gold, silver and bronze medals and diplomas will be awarded; and also a gold medal to the farmer supplying the largest proportion of wheat used in the winning flour.

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Honey.—National Honey Show, Crystal Palace, London, October 2 to 5, and the Dairy Show, Royal Agricultural Hall, London, October 22 to 25. Following classes at each show open only to authorized packers under the National Mark Honey Scheme:—

- (a) 6 jars of granulated honey, 3 each of 1 lb. (squat), and $\frac{1}{2}$ lb. (Ministry of Agriculture and Fisheries Registered Design No. 761017.)
- (b) 3 sections of honey packed in the Ministry of Agriculture and Fisheries pattern carton (Registered Design No. 757921), or cellophane wrappers.

Money prizes are offered in each class. Particulars and entry forms for the National Honey Show from Mr. F. H. Lawrence, 61, Arthur Road, London, S.W.19, and for the Dairy Show from the Secretary, British Dairy Farmers' Association, 28, Russell Square, London, W.C.1. Closing dates are September 14 and September 9 respectively.

Dressed Poultry.—At the Dairy Show there will be two classes for market packs of dressed poultry to comply with the statutory requirements under the Agricultural Produce (Grading and Marking) Acts:—(a) a market pack of 6 cockerels, net weight not to exceed 33 lb.; (b) a market pack of 6 cockerels or 6 pullets, net weight not to exceed 24 lb. Closing date September 28. Schedule from the Secretary, British Dairy Farmers' Association, address above. The prizes in each class are 1st, £4; 2nd, £3; 3rd, £2.

Essay Competition.—Grocers' Exhibition, Royal Agricultural Hall, London, September 21 to 27. Prizes and diplomas are being offered to master grocers and assistants for a paper, not exceeding 1,000 words, on "The National Mark—Its Value to Grocers." Closing date, August 31. Entry forms from Mr. H. S. Rogers, 11, Queen Victoria Street, London, E.C.4.

Report on the Marketing of Vegetables in England and Wales.—With the publication of the Ministry's Orange Book on the Marketing of Vegetables,* a long-felt want for a comprehensive work on this subject has been supplied. To deal satisfactorily with the marketing of so many different crops—some 40 are dealt with—the Report, which is well illustrated, is of necessity somewhat lengthy. It

* *Economic Series No. 25.* Obtainable from His Majesty's Stationery Office, or through any bookseller, price 1s. net, post free 1s. 5d.

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describes present marketing practice from many angles and, in its concluding chapter, suggests the lines along which reforms in the industry might be achieved.

The Report is believed to be the first of its kind on the subject to be published in any country, and a perusal of its pages will quickly indicate the complexities of the various problems with which the vegetable industry is confronted. After a preliminary survey of supplies, which provides an indication of the quantities of home-produced and imported vegetables that are available for consumption, there is given an outline of the many intricate factors that govern the market, and the Report then proceeds to trace the whole process of vegetable marketing from the grower's holding to the consumer's table.

It is clear that the greatest need of the industry to-day, and the indispensable preliminary to further progress lies in the extension of standardization. This is a subject that it is impossible to consider apart from other aspects of marketing, and there are few chapters of the Report that do not have some bearing upon it. Economies in transport, adequate marketing intelligence and effective publicity are examples of developments that must wait on the general adoption of a comprehensive and national system of standardization both of product and container. The subject is, however, directly treated in the four chapters, occupying some 45 pages, grouped together in Part III under the title "Preparation for Market." Here the methods of harvesting, grading and packing adopted by home growers are described at length, and the presentation of home produce is compared with the form in which imported produce arrives on the home market. The next chapter describes the measures of standardization that have been adopted in many countries abroad. A beginning has been made in this country by the introduction of the voluntary National Mark Schemes. These, providing national standards of grading and packing, have already had a marked influence in improving marketing methods and reducing the costs of handling; home-grown supplies are now competing to better advantage with imports. Much, however, remains to be done, both in the wider adoption of the standards laid down and in the extension of the practice, with modifications, to cover grades lower than the best. Here, as in other questions of marketing, the decision rests with the industry itself. The Report is commended for close perusal by all

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engaged in the cultivation and distribution of vegetable crops.

Flowers and Plants Publicity Committee.—*Jubilee Window Boxes: A Campaign for their Continuance.*—Important correspondence on the subject of window boxes, accompanied by a leading article, "London's Flowers," has appeared recently in *The Times*, as the result of a letter from Sir Lionel Earle (Chairman of the Ministry's Flowers and Plants Publicity Committee) outlining the steps taken by the Committee responsible for the organization of the Jubilee window box displays. The object of Sir Lionel Earle's letter was to secure that, wherever practicable, the window boxes shall be retained permanently and the displays be repeated next year.

Mr. Guy Dawber, the well-known architect, wrote urging that London streets ought always to be decorated with flowers in the summer; and Professor Thomas Bodkin, of the Barber Institute of Fine Arts, University of Birmingham, contributed a letter on colour in modern buildings, in which he dealt, *inter alia*, with the subject of window boxes from the architect's standpoint. Other letters on such subjects as suitable plants, drainage of boxes, and methods of culture, have appeared.

The Times correspondence, and numerous references in other newspapers, reveal enthusiastic interest on the part of a wide section of the public in the whole question of window boxes as a means of brightening London and, one might suggest, our other cities and large towns. The correspondence is continuing, and numerous applications are being received for the leaflet on window-box displays issued by the Ministry. From press cuttings and letters received by the Ministry, it appears that the movement to extend window-box displays is spreading to other towns such as Glasgow and Bristol.

Considerable progress in this movement has been made by the Sub-Committee of the Flowers and Plants Publicity Committee, which has been dealing with window-box decorations, and on which H.M. Office of Works, the London Gardens Society, the London Society, the Regent Street Association, and the British Flower Marketing Association are represented. The Duke of York is taking a keen interest in these efforts and has given instructions for the continuance of the flower display in his window boxes at 145, Piccadilly. The window boxes at Gwydyr House, the

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Air Ministry building in Whitehall, and at Nos. 10 and 11, Downing Street, are to remain by special permission of the Chief Commissioner of Works. The flower boxes at Sloane Square, installed for the period of the Jubilee celebrations by the Chelsea Borough Council, are to be kept filled with flowers until the autumn, and the number of boxes is to be increased next spring. Window-box displays are also to be maintained permanently by a number of leading organizations and business firms throughout London, as well as by private householders.

An interesting experiment, in which the Marylebone Borough Council, the Regent Street Association and the British Flower Marketing Association are combining, is to be made at Oxford Circus. Hanging baskets of flowers of a new type are to be fixed to the lamp standards, and the flowers will be chosen to match the window-box displays on the surrounding premises. If the flowers do well, the scheme may be extended to other suitable sites.

British Columbia: Fruit Marketing Schemes.—Two more fruit schemes under the Canadian Natural Products Marketing Act, 1934, providing for the regulation of marketing by local boards under the supervision of the Dominion Marketing Board, have been approved.

The Small Fruits and Rhubarb Marketing Scheme (June 7, 1935) regulates, as from June 10, 1935, the marketing of strawberries, raspberries, loganberries, blackberries, youngberries, red and black currants, gooseberries, grapes and rhubarb produced within a described area of British Columbia. Before its powers are delegated by the Dominion Board to the Local Board a poll is to be taken of all persons who produce the regulated product for sale, and the Minister of Agriculture will determine the percentage of favourable votes and acreage necessary for the continuance of the Scheme. A provisional board is appointed. Registered growers are to nominate annually from among their number the three members of the permanent Local Board, and for election purposes each grower producing on one acre or more is to have one vote.

The Scheme confers upon the Board wide powers for the control of marketing. Compulsory sale through the Board's agency is contemplated. Provision is made for the registration and licensing of all persons engaged in production or marketing, and for the rendering of information and returns. Marketing charges and tolls may be imposed up to a maximum of two cents per box of rhubarb, one-tenth of a cent per pound on all fruits for canning and manufacturing purposes, and four cents per crate for all other kinds.

The Board is empowered to establish a pool for the equalization of returns, and may on any day divert surpluses of fresh fruit to the canning, jam making or processing industries, in which event returns for that day are to be pooled. Any scheme of pooling, however, must not deprive a grower of any premium which he would normally receive as a result of a superior product. Compensation for losses sustained as the result of any order of the Board in determining the destination of the regulated product may be paid out of the pooled returns.

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Hothouse Tomato and Cucumber Scheme (June 8, 1935).—The Dominion Marketing Board has now reported that this Scheme is endorsed by producers representing approximately 85 per cent. of the total production; the Scheme will therefore become effective, by Order in Council, as from June 10, 1935. The Scheme is to regulate the marketing of hothouse tomatoes and cucumbers grown within the province of British Columbia. The Board is empowered to impose marketing charges and tolls for the purpose of the Scheme. Other marketing powers are not specified but may be taken by the Board in compliance with the provisions of the Act.

Union of South Africa: Dairy Industry Control.—A Government Bill which was introduced in the Union Parliament in March last proposed to consolidate and amend the laws governing the dairy industry. That Bill was, however, subsequently withdrawn owing to pressure of business, and a shorter and simpler Bill was substituted, and passed through all stages before Parliament rose. The new Act amends the Dairy Industry Control Act, 1930, so as to enable the Dairy Industry Control Board to subsidize the consumption of butter and cheese by approved classes of consumers. The Act also empowers the Board to use the levy funds to stabilize domestic prices and to reduce the cost of production, manufacture or marketing of dairy produce.

It is understood that the Union Government proposes to introduce during the next session a comprehensive Dairy Control Bill on the lines of the one recently withdrawn.

Irish Free State: The Dairy Produce (Price Stabilization) Act, 1935.—This Act, which became law on June 13, provides for the stabilization of prices of butter and other milk products; the control of the distribution, sale, import and export of such products; and the imposition of levies and payment of bounties.

Part I makes provision for the partial continuance of the Dairy Produce (Price Stabilization) Act, 1932, which expired on March 31, 1935, so as not to interrupt the payment of levies and bounties, or the maintenance of the butter fund until it is wound up as provided by the new Act.

Under Part II all producers of non-creamery* butter and all persons who acquire non-creamery butter either for re-sale or for use in a butter factory are to be registered with the Ministry of Agriculture. Manufacturers of creamery and non-creamery butter will pay levies on any butter they manufacture after April 1, 1935 (except on certain butter which has been exported). Power is given the Minister to impose levies on other milk products except in so far as they are exported; he may make regulations concerning the various levies, but pending such regulations the levy on all butter is to be 39s. per cwt.

The Minister may suspend or revoke the levy on any particular substance, and may make special regulations for non-creamery butter manufactured within or adjacent to the Kerry Cattle Area.

Part IV provides that no butter may be imported except under licence and subject to payment of a levy on each consignment. The rates of the levy on imported butter will be prescribed by the Minister, who may vary or suspend the levy as he thinks fit; he may also prohibit the import of all or any particular class of dairy produce.

Under Part VI the Minister may prohibit the export of milk products except under licence and under Part VII export bounties are to be paid on all milk products manufactured after April 1, 1935, and on any article of food containing such milk products. Until an order

* Creamery means premises registered or licensed as such.

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laying down the rates of bounty is made by the Minister, the Act provides that the following rates shall be effective:—

	£	s.	d.	
1. On a creamery butter delivered on sale in the Irish Free State and on which a levy at the appropriate rate was paid	3	4	0	per cwt.
2. On all other creamery butter	1	5	0	„
3. On non-creamery butter which was in the ownership and possession of the exporter thereof on March 31, 1935	1	12	8	„
4. On all other non-creamery butter	1	5	0	„
5. On tinned cream	0	7	6	„
6. On bulk cream (Milk fat 50 per cent. or over)	0	0	10½	per gal.
7. On bulk cream (Milk fat less than 50 per cent.)	0	0	5½	„
8. On raw cheese	0	8	0	per cwt.
9. On processed cheese	0	8	0	„
10. On condensed milk (Full cream)	0	2	8	„
11. On dried or powdered milk (Full cream)	0	8	0	„

Part VIII empowers the Minister to fix the maximum net whole-sale price for any specified class of butter and, in respect of creamery butter, a minimum price, variable according to quantity in consignment, area of delivery, class or description of butter and method of packing. The Act provides for minimum prices (£7 1s. od. to £7 5s. od. per cwt.) to be effective until an order is made by the Minister.

Part IX of the Act provides for the establishment of a Dairy Produce (Price Stabilization) Fund and the winding-up of the existing Butter Fund, any amount standing to the credit of the latter to be transferred to the former. All monies received by way of levies or registration fees are to be paid into the Fund, out of which will be paid the bounties, and expenses of any scheme approved by the Minister for the regulation of the sale of butter. The Oireachtas may, if the money standing to the credit of the fund is insufficient, advance such sums to the Fund as are required, the aggregate of such sums to be refunded not later than May 31 following.

A central marketing organization, operating under rules approved by the Minister, is referred to, but no indications of its constitution or functions are given.

AUGUST ON THE FARM

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It appears as if the corn harvest will be rather earlier than usual in this district. The last two years, 1933 and 1934, were very early, and, at the College Farm for instance, there was the unusual experience of not only completing the harvesting of corn in August, but of doing this in two successive years; in 1933 harvesting was finished by August 14, and in the following year, 11 days later. There cannot have been many years in which the harvest was as early as in 1933. In an old diary kept at a neighbouring farm, it is recorded that in 1868, the reaping of corn was begun on July 22, and harvesting completed by August 15.

Early harvests are welcomed despite the fact that they are nearly always accompanied by under-average crops. They enable work to commence early on the stubbles, and give the farmer that feeling of satisfaction that comes from being "well on with the work"; this feeling cannot be experienced to the same degree by those whose work is independent of the weather.

"Lodging."—The extent and degree of lodging in cereal crops is generally a factor of much greater concern to the farmer than earliness or lateness, especially in the wetter districts and where the crop follows a ley of a few years' duration. Lodging is the subject of much investigation at home and abroad; in the wheat-growing countries lodging is not severe, but, in those countries even slight lodging becomes a serious matter where large combines are in use. Investigations on lodging are conducted on two main lines, directed (1) to discover why some straws are weak and others strong, and (2) to the breeding of varieties resistant to lodging. The fundamental approach to the subject, i.e., discovering the causes of lodging, will take time, and, at present, the best we can do is to select varieties because they are strong in the straw.

At the College Farm, this question, as affecting the oat crop, has received close attention for a number of years, strength of straw being regarded as equal in importance to

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yield. It can be said, of course, that no known variety exists that can resist lodging under the worst weather conditions; further, that the stage of growth of the crop when the unfavourable weather is experienced is an important factor. Thus, in the trials at the College Farm, Black Tartarian oat, a variety that has nearly always proved weak in the straw, was, in 1931, one of the best as regards standability. There is little doubt that the bad weather conditions had struck the crop when this variety happened to be in a stage of growth when it was very resistant to lodging.

The oat varieties grown in bulk at this farm are Record, Star and Marvellous; Elder, an oat bred by the Scottish Plant Breeding Station, has been added to the list this year. These varieties are grown because, in addition to yielding large crops of good quality, they have proved the best as regards standing power. Victory has been given up after occupying an important position at this farm for many years, having been replaced by Star. The latter is very similar to Victory in yielding power and quality, but it has proved itself definitely superior to it in standing power. Elder is now in its third year of trial at the farm. In the two years during which it has been fully tried, it has proved superior to all other varieties in standing power; as regards quality, it was valued at 4*d.* per cwt. below the best variety in one year, and, in the following year, it was priced as equal to the best of all the varieties under test. It might be added that it is unusual to grow a variety in bulk at this farm before it has been tried for at least three years.

Where lodging is bad, the binder has to be put aside, and the mowing machine (with reaping tackle) brought into use. It is claimed by some that a skilfully-handled binder can be made to cut as well and to tie as neatly in the worst laid crop, as when a mower is used. An acquaintance who often makes this claim for the binder never hesitates, however, to resort to the mower in a really badly-lodged crop. On sloping land, some advantage may sometimes be gained by using a right-hand cut binder instead of the usual left-hand model. Those who contemplate changing their binder for this reason would be advised to try a right-hand cut before purchasing one, as the problem may not be as simple as it appears. On a farm where a binder was disposed of in order to get one with a right-hand cut, the change has been regretted. At this farm the crop lodges in a direction approximately diagonally down the field, and it was con-

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sidered that, cutting one way with a right-hand cut along the top of the field, would be better than cutting one way with a left-hand machine along the bottom. Actually, cutting along the top, with the crop lying to meet the machine, but inclined from the driver, there is a tendency for the crop to run on and accumulate on the divider; in addition, there is the extra pull on the machine through the crop having to be carried up the inclined platform canvas.

Potatoes.—In a dry summer rooks may cause appreciable damage in areas where small acreages of potatoes are grown. In 1934, in a field where early, second early, and late varieties were grown, the damage was practically confined to the variety Ballydoon, a second early. A preference for a particular variety by vermin is interesting. In some swede variety trials at the College Farm, rabbits invariably selected the variety "Superlative," even when growing amongst about 10 others. One would hesitate to draw definite conclusions from such preference without knowing the remainder of the vermin's rations, and would not be as definite as a certain smallholder who professed nothing but scorn for a certain mineral mixture because the rats had left a bag of it untouched all the winter!

At this time of the year the chats, or potatoes that are too small for marketing, commence to make their way into the farmyard, and may be used for pigs, or for cattle. Potatoes contain about 23 per cent. of dry matter, mostly of a starchy nature, and should be used in a ration to replace foods such as maize, or barley; theoretically, $4\frac{1}{2}$ cwt. of potatoes should replace about 100 lb. of maize meal. In practice, however, potatoes when uncooked often fail to give the expected results when given to pigs, particularly young pigs. Unless given in very small quantities uncooked potatoes appear to have some harmful effect on young pigs. Thus, in an experiment at the College Farm, potatoes were supplied to newly-weaned pigs so as to provide about 30 per cent. of the total dry matter in the ration. The amount, however, had to be reduced, since the pigs were obviously not thriving, their coats were getting rough and dirty, and some of the pigs eating filth and bedding, despite sufficiency of weatings and fish meal included with the potatoes. After about a month, the proportion of potatoes was cut down by a half, and the pigs started to improve. The trial lasted for 11 weeks and the conclusion was reached that it would have paid better to throw the potatoes away than to give

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them in the above quantities to the young pigs. This does not prove that potatoes should not be used for young pigs, but that, when uncooked, they should be used with caution.

Cattle can make good use of potatoes, and there will be little danger of choking if the potatoes are thrown out in a field; cattle are more apt to choke when they are tied, and are thus not able to move their heads about freely.

Swedes and Mangolds.—These crops now fill up the rows, and further intertillage becomes impossible. Up to this time, visible growth has been mainly in the leafy part, but in August, the bulby, or fleshy part begins to swell. There is a general belief amongst farmers that the long, dewy nights are needed for the bulbing of roots and for the ripening of corn. One is at first inclined to dismiss such an idea, adding that, because the long dewy nights happen to occur at that stage of growth, they are not necessarily essential for the maturation processes. Recent work, however, on photoperiodism, i.e., the effect of length of day on growth processes, makes for more caution in dismissing such an idea as absurd. The dew may be unnecessary, but it is quite probable that the longer nights may be conducive to bulbing in some species. Thus, when, after great expense, a collection of South American wild and cultivated forms of the potato were grown for observational purposes in N. Russia, some of them did not form tubers at all in that locality; this was held to be due to the great length of day in that region. Again, in experiments carried out in America, the variety "Irish Potato" failed to form tubers when exposed to 18 hours' light in each 24 hours; the best tuberization took place with 10 hours' light. Interesting results of this kind, in which certain stages of growth seem to be correlated with length of day, have also been obtained at Aberystwyth, by Tincker, who observes that we are apt to overlook the commonplace phenomena of species flowering at about the same time year after year; he observes that "whilst temperature, rainfall and other weather conditions do cause fluctuations in the time of blossom production, spring-flowering types remain spring-flowering types, and those that flower in the long days of early summer are not made to flower in the late autumn by such weather conditions."

Sheep Maggot Attacks.—August, and the first part of September is the period during which most trouble is caused

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by the Sheep Maggot Fly, despite the fact that most of the dipping is carried out at this time. In a five-year survey carried out by Dr. W. Maldwyn Davies, the earliest and the latest dates on which attacks were recorded were May 5, and October 19, though very few attacks occurred in these two months. In his researches (*Annals of Applied Biology*, May, 1934 and 1935) Dr. Davies proves that, in North Wales at least, only one type of blowfly is responsible for attacking live sheep. This throws an interesting sidelight on the methods, sometimes suggested, of attacking the sheep maggot problem by catching the flies in traps baited with dead meat; the offending species would only be one amongst many attracted in this way.

It is difficult to emphasize too much the importance of starting with a clean dip when carrying out dipping operations. Provided rainy weather keeps off until the sheep dry, a clean arsenical dip should give comparative freedom from attacks for about three weeks. On farms where there is no dipping accommodation it is in some parts customary to take the sheep to a neighbouring farm and pay a fixed rate per sheep for dipping. In many cases the dip is not clean, and the owner is well advised to set up a "home-made" arrangement instead. If immunity from the blowfly is the only object in view, excellent results can be obtained by packing the sheep closely together and rigging up an arrangement by which it is possible to walk above them. An ordinary watering can may then be used for spraying the sheep with the dip. In this way the sheep rub the dip into each other's wool, every drop of the dip is clean, and the method is economical in powder.

When dipping sheep in the ordinary way, the sheep should not be thrown into the dip when they are in a hot condition. When the sheep are gathered in from large fields on a hot day, they should be allowed to rest before dipping. Besides the possibility of arsenic absorption through the skin, it is not unlikely that hot and thirsty sheep might swallow a little of the dip.

The practice of some shepherds of rubbing out maggots from the affected sheep before applying the larvicidal lotion is shown in Dr. Davies's researches, to be likely to lead to an increase in the local blowfly population. Contrary to general belief, the maggots do not die when rubbed out on to the ground; if they are a little over half size, that is, a little over 24 hours old, they can resist starvation and pass

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on to the subsequent stages. So resistant is the larva, once it has reached a certain size, that it can winter in the soil in that stage—indeed, this is the normal state of the pest for wintering. In the trials referred to above, prepupae (i.e., grubs in the non-feeding stage prior to pupation) have been removed from frozen soil, and subsequently produced flies.

The factors that encourage attacks by the sheep blowfly are also the subject of investigation by Davies and Hobson. It is known that infestation is much more severe in wet weather, and, in these experiments, critical work has been done on the sensitivity of the maggots to drying, and on the humidity in the fleece, near the skin. The larvae are ill adapted to withstand dry conditions at the temperature of the fleece above the skin, and it is only when the wool is moist through soiling, etc., that they can develop. Close inspection will often reveal cases of "blow" that have failed to "take" for this reason. Certain substances, such as putrefying material, attract the sheep blowfly to lay eggs on the sheep; the excreta of the maggots themselves is especially powerful in this respect. Dr. Hobson failed, however, to get the sheep blowfly to lay eggs on these substances unless they were placed near to the skin of a live sheep; neither sheep skin, nor wool nor other live animals could take the place of the live sheep in this respect.

NOTES ON FEEDING

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Whey.—Whey is either a godsend or an embarrassment. Invaluable as a feeding stuff for pigs in the moderate quantities in which it is produced on farms, in large quantities it can easily become a public nuisance.

On paper it has but small feeding value. It is little more, indeed, than a dilute solution of lactose, with inconsiderable quantities of fats, albumen and mineral salts, a Starch Equivalent value of 6 and a protein equivalent of 0.6; but it is a milk product, and as such possesses in some measure the accessory value of milk itself. Vitamins A and D are known to pass away, in part, with the whey from the cheese vat; some 70 per cent. of the mineral salts escape also, the ash being rich in phosphoric acid, potash and lime.

Accessory Value.—The beneficial effects of small quantities of milk and separated milk in the daily ration of pigs, have frequently been demonstrated. The value of separated milk varies, indeed, almost inversely in proportion to the quantities fed. As a rule the farmer has no difficulty in obtaining full, or at least high value from it, for if separated milk is produced on a farm at all it is produced in comparatively regular and small amounts throughout the year; the pigman's task is merely to make it go as far as possible.

Presumably the same law as to values is true also of whey, though it does not seem to have been demonstrated with the same clarity as with separated milk. Some British experiments have in fact failed to demonstrate that it possesses any value additional to that deducible from ordinary analysis. The evidence as to its accessory value from cheesemaking farms is, however, too strong to be overlooked. Whey-fed pigs generally proclaim the nature of their ration by their very appearance; they carry a bloom which speaks for itself. Most cheesemaking farmers would agree that the benefits of whey feeding are in great measure independent of the quantity fed.

NOTES ON FEEDING

It is, however, much more difficult to turn this fact to account than it is in the case of separated milk. Cheese-making is a seasonal affair. All the cheese of the world is made from grass milk; every cheese-maker aims at a spring calving herd, with a flush of milk in summer and almost none in winter; the pig feeder's task is to utilize a great volume of whey in summer, while for the remainder of the year he begs in vain for enough to go round. Naturally most pig feeders solve the problem by buying in stores for the summer months; not for them the bonuses attaching to level dairies.

Utilization and Storage.—Whey is far too watery to make concentration or drying on the farm a feasible proposition—even on a large scale there are great economic difficulties owing to the low value of the product. It is not an easy substance to store, owing to its bulk and to the ease with which it ferments. In the Cheshire area it is generally run from the vats to slate tanks in the dairy and thence by gravity to underground tanks in the piggery. Formerly the whey in the slate tanks was skimmed and the cream churned to make whey butter—a product much appreciated by people who liked that kind of thing. Nowadays, when any attempt is made to recover the fat, the whey is generally driven by injector pumps to power separators, and a product of much greater purity results. On many cheesemaking farms, however, the whey is allowed to run direct to the piggeries. There is little doubt that this involves an almost complete loss of the fat; for in the underground tank it rises to form a slowly decomposing but otherwise permanent scum, which rises and falls with each influx and removal of whey. Since the whey is eventually pumped to the pig troughs, comparatively little of the fat reaches the pigs.

Theoretically this loss of fat involves a considerable diminution in feeding value. Henry puts the difference in value between separated and unseparated whey at 25 per cent. Sammis, on the other hand, estimates the reduction in food value at only 10 per cent. Our own impression is that the difference is more apparent than real. In group feeding trials we have been unable to obtain significant differences in growth rates from rations including 1 to 2 gal. per head per day, and popular opinion in the district credits the separated article with the same feeding value as the unseparated. It may very well be that, added to an

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ordinary meal ration, unseparated whey brings up the oil content beyond the optimum. The pig's fat requirements are easily satisfied. Kellner puts the optimum fat supply for a 200 lb. pig at 0.1 lb. per day. Almost any ordinary meal mixture will supply this quantity.

Fermentation Losses.—Much more serious than the loss of fat is the loss of protein, and especially of lactose, that takes place owing to fermentation in the whey tank. It is in practice impossible to pump the whey tanks empty every day, or even to fit the consumption exactly to the supply; do what one will there come periods when the whey gains on the pigs and accumulates in the tank. In such circumstances it may become very acid, and offensive odours may arise from the proteins—odours commonly and unjustly attributed to the pigs next door.

Berry showed some years ago, that in whey stored for a month the lactose content fell from 4.9 to 4 per cent. in 37 days, and to 2.8 per cent. in 80 days. In three months it had little more than half its original feeding value, while the acidity had risen from 0.14 to 0.6 per cent.

Quite apart from its nutritive value, fresh whey is almost certainly preferable to whey that has become acid as a result of storage. In practice it is usually neither quite fresh nor very sour when it reaches the pig trough, the acidity being rarely so marked as to raise any question of its suitability for pig feeding. A few months ago an exceptional sample submitted to us was found to show 1.2 per cent. acidity. On investigation this sample was found to have been purchased from a near-by factory and stored in a tank that had not been cleaned out for a month or more. Pigs fed on this whey were scouring badly and displayed other symptoms of unthriftiness, while other pens receiving fresh whey but otherwise similarly fed were quite healthy. When the use of the sour whey was discontinued the sickly animals recovered at once.

In passing, we may observe that these difficulties in fully utilizing the theoretical food value issuing from the whey tap of the cheese vat make it almost impossible to express the monetary value of the by-product in terms of the milk from which it arises. A gallon of milk yields in the dairy about 0.8 gal. of whey; but when allowance is made for mechanical and chemical losses during transit and storage this figure is reduced to 0.5 or 0.6 gal. Roughly, it is true

NOTES ON FEEDING

to say that a gallon of milk in the dairy vat yields half a gallon of whey in the piggery.

Corrosive Action.—A further drawback to the use of whey arises from its corrosive action on metals and concrete. On cheesemaking farms it is generally conveyed to the piggeries by glazed earthenware pipes, but distributed throughout the pens by iron, copper or lead pipes controlled by brass or gunmetal taps. Whenever it comes in contact with brass or copper a certain amount of corrosion takes place. Visible crusts of verdigris are not uncommon. We have on several occasions met with instances of sickness and death in pigs arising from copper poisoning. In one instance as much as one twenty-fifth of an ounce of copper (expressed as copper sulphate) was found in a gallon of whey, the pigs consuming it showing every sign of metallic poisoning.

Disease Risks.—It is a sad commentary on the state of our milk supplies that whey feeding should involve disease risks, but in no discussion can this question fairly be burked. That the tubercle bacillus occurs in milk samples to the extent of 10 per cent. or thereabouts is undeniable; that it can pass uninjured through the cheesemaking vat and live on in the whey, despite the acidity, seems highly probable. There is, however, no reliable body of evidence to show that pigs do in fact often contract the disease from infected whey—statistical evidence from bacon factories supplied from cheesemaking areas would be useful. On general grounds, however, sterilization of whey prior to feeding would seem advisable. The Germans, thorough as usual, make no boggle about the matter. Their Diseases of Animals Act prohibits the sale of unsterilized by-products from milk factories.

Many as are the little difficulties attaching to its use, they are of little moment to the pig feeder compared with the fact that whey in large quantities comes in "buckshee" from the dairy. Naturally it is most easily utilized by fattening animals; it is invaluable also for young stores. Many a bunch of stores bought dear in the cheesemaking areas is kept for a month "till they are worth the money" on whey and grass only, ultimately becoming a paying proposition (though purists might object to the method of accountancy). Some writers aver that whey cannot safely be fed to suckling sows or little pigs; but writing from a cheesemaking area we are unable to agree. In this district practically all sows

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(our own included) are regularly fed on whey and meal slop; and our rearing difficulties are certainly no greater than in other areas. Whey is, however, no panacea. It does not enable the pig keeper to bring his litters unscathed through the grisly period of weaning. Even when whey is available in quantities weanlings are apt to lose for two or three weeks that appearance of abounding health that characterizes them while still on the sow.

Factory Supplies.—All the difficulties associated with whey utilization are intensified in cheesemaking factories. Milk supplies, as on farms, are very irregular; only very small or very large factories can deal with their own by-products, for there seems to be a natural law prohibiting the gathering together in one place of more than a thousand pigs; and the plant needed for drying is very costly. For the most part factory owners rely on pig feeders in the neighbourhood to provide an outlet. In view of transport costs they are naturally concerned to induce individual pig keepers to take large quantities; price considerations pale before those of expediency. For factory as for farm, the problem of whey disposal is that of turning the greatest possible quantity into flesh rather than that of making the most economical use of it.

The Whey Ration.—"A pig to a cow" has from time immemorial been the standard allowance on cheesemaking farms: since the milk output generally approaches 3 gal. per cow at the flush, the rule probably expresses the normal appetite of a fattening baconer. Fattening pigs can, however, drink more than that. In trials at the West of Scotland Agricultural College, pigs fed on whey only consumed up to 6 gal. per head per day, and increased in weight at the rate of 1 lb. per day.

Most British experiments on whey feeding have consisted in replacing portions of a standard meal ration with 1 to 3 gal. of whey. Dr. Bünger, of Kiel, has tackled the problem the other way about (in the Fatherland the whey question resolves itself primarily into one of saving the national meal bill). He has fed pigs to satiety on whey and then added the minimum quantity of meal necessary to supply the food constituents required for normal growth. By this means, live weight increases of $1\frac{1}{2}$ lb. per day were obtained throughout the whole feeding period (80 lb. to 220 lb. live weight) from a total meal consumption of 2.2 lb. He states

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that pigs of 150 lb. live weight or more will consume more than $5\frac{1}{2}$ gal. of whey per day, and somewhat unnecessarily adds "steps must be taken to keep the sty dry." As to dead weight percentage, he claims that, provided the ration is reduced to about $1\frac{1}{2}$ gal. a day for the last fortnight of the fattening period, animals kill out quite as well as those fed on meals only. Dr. Büniger advises feeding the meal in the form of a stiff porridge, and the whey in a separate trough.

It is impossible to judge from his report how pigs fed on such large quantities of whey would grade under the system now adopted in this country. We cannot, therefore, interpret his results exactly in English terms. One would anticipate that on such a watery diet pigs would grade badly, though it has to be admitted that the evidence from our cheesemaking farms is hopelessly contradictory. It would be rash to conclude that such extreme measures would prove uneconomic under our conditions; the economics of whey feeding is a complicated problem involving questions of costs of a by-product and capital outlay, as well as the food-increase ratio and carcass quality. There is no simple answer to the question of the optimum allowance.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

		Starch		Protein		Per ton
		equivalent	Per cent.	equivalent	Per cent.	
Barley (imported)	.. ..	71		6.2		5 13
Maize	.. ..	78		7.6		4 7
Decorticated ground-nut cake..	.. ..	73		41.3		6 15
„ cottonseed cake ..	.. ..	68		34.7		6 15
(Add 10s. per ton, in each instance, for carriage.)						

The cost per unit starch equivalent works out at 1.36 shillings, and per unit protein equivalent, 1.3 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

PRICES OF FEEDING STUFFS

FARM VALUES.

Crop	Starch	Protein	Food value
	equivalent	equivalent	per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9.6	5 10
Oats	60	7.6	4 11
Barley	71	6.2	5 5
Potatoes	18	0.8	1 6
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 10
Beans	66	19.7	5 15
Good meadow hay	37	4.6	2 16
Good oat straw	20	0.9	1 8
Good clover hay	38	7.0	3 1
Vetch and oat silage	13	1.6	1 0
Barley straw	23	0.7	1 12
Wheat straw	13	0.1	0 18
Bean straw	23	1.7	1 13

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu-rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro-tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	5 15	0 8	5 7	72	1 6	0.80	9.6
Barley, British feeding	5 15	0 7	5 8	71	1 6	0.80	6.2
„ Canadian, No. 3 Western ..	5 18	0 7	5 11	71	1 7	0.85	6.2
„ „ No. 4 „ ..	5 12†	0 7	5 5	71	1 6	0.80	6.2
„ Argentine	5 10*	0 7	5 3	71	1 5	0.76	6.2
„ Persian	5 13	0 7	5 6	71	1 6	0.80	6.2
Oats, English, white	7 17	0 8	7 9	60	2 6	1.34	7.6
„ „ black and grey	7 13	0 8	7 5	60	2 5	1.29	7.6
„ Scotch, white	8 10	0 8	8 2	60	2 8	1.43	7.6
„ Canadian, No. 2 Western ..	8 2	0 8	7 14	60	2 7	1.38	7.6
„ „ No. 3 „ ..	7 3†	0 8	6 15	60	2 3	1.21	7.6
„ „ mixed feed	6 17	0 8	6 9	60	2 2	1.16	7.6
Maize, Argentine	4 7	0 6	4 1	78	1 0	0.54	7.6
„ Danubian Gal. Fox. ..	4 10†	0 6	4 4	78	1 1	0.58	7.6
„ South African, No. 2 White Flat	4 15†	0 6	4 9	78	1 2	0.62	7.6
Beans, English, winter	6 5½	0 16	5 9	66	1 8	0.89	19.7
Peas, Japanese	13 7†	0 14	12 13	69	3 8	1.96	18.1
Dari	6 5†	0 7	5 18	74	1 7	0.85	7.8
Milling offals—Bran, British ..	5 0	0 14	4 6	43	2 0	1.07	9.9
„ „ broad	5 7	0 14	4 13	43	2 2	1.16	10
„ Middlings, fine, imported ..	5 17	0 12	5 5	69	1 6	0.80	12.1
„ Wentings†	5 17	0 13	5 4	56	1 10	0.98	10.7
„ „ Superfine†	6 10	0 12	5 18	69	1 9	0.94	12.1
„ Pollards, imported	5 5	0 13	4 12	50	1 10	0.98	11

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d	%
Meal, barley	7 5	0 7	6 18	71	1 11	1-03	6-2
" " grade II	6 10	0 7	6 3	71	1 9	0-94	6-2
" maize	5 0	0 6	4 14	78	1 2	0-62	7-6
" " South African ..	4 17	0 6	4 11	78	1 2	0-62	7-6
" " germ	5 5	0 10	4 15	79	1 2	0 62	8-5
" locust bean	7 10	0 5	7 5	71	2 1	1-12	3-0
" bean	8 5	0 16	7 9	66	2 3	1-21	10-7
" fish, white	13 15	2 0	11 15	59	4 0	2-14	53
Maize, cooked, flaked ..	5 12	0 6	5 6	84	1 3	0-67	9-2
" " gluten feed.	5 10	0 12	4 18	76	1 3	0-67	19-2
Linseed cake, English, 12% oil ..	8 2	0 19	7 3	74	1 11	1 03	24-6
" " " 9%	7 15	0 19	6 16	74	1 10	0-98	24-6
" " " 8%	7 10	0 19	6 11	74	1 9	0-94	24-6
" " " 6%	7 15 ^s	0 19	6 16	74	1 10	0-98	24-6
Soya-bean cake, 5½% oil	7 10 ^s	1 6	6 4	69	1 10	0-98	36-9
Cottonseed cake—English, Egyptian seed, 4½% oil	4 12	0 16	3 16	42	1 10	0-98	17 3
" " Egyptian, 4½% ..	4 1	0 16	3 5	42	1 7	0-85	17-3
" " decorticated, 7% ..	6 15 ^t	1 6	5 9	68	1 7	0-85	34-7
" " meal, decorticated, 7% ..	6 12 ^t	1 6	5 6	68	1 7	0-85	34-7
Coconut cake, 6% oil	6 5	0 16	5 9	77	1 5	0-76	16-4
Ground-nut cake, 6-7% oil	6 6*	0 17	5 3	57	1 10	0-98	27-3
" " " decor., 6-7% oil ..	7 0	1 6	5 14	73	1 7	0-85	41-3
" " " imported, decorticated, 6-7% oil	6 10	1 6	5 4	73	1 5	0-76	41-3
Palm kernel cake, 4½-5½% oil ..	6 5 ^t	0 11	5 14	73	1 7	0-85	16-9
" " " meal, 4½% oil ..	6 5 ^t	0 11	5 14	73	1 7	0-85	16-9
" " " meal, 1-2% oil	5 12	0 11	5 1	71	1 5	0-76	16-5
Feeding treacle	5 0	0 7	4 13	51	1 10	0-98	2-7
Brewers' grains, dried ale	4 15	0 10	4 5	48	1 9	0 94	12-5
" " " porter	4 7	0 10	3 17	48	1 7	0 85	12-5
Dried sugar beet pulp (a)	5 15	0 5	5 10	66	1 8	0-89	5-2

(a) Carriage paid in 5 ton lots, ° At Bristol † At Hull. ‡ At Liverpool.

* In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London unless otherwise stated and refer to the price ex mill or store. The prices were current at the end of June, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 105. per ton as shown above, the cost of food value per ton is £0.15. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5½. Dividing this again by 22.4 the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1 29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N, 7s. 6d., P₂O₅, 2s. 1d., K₂O 2s. 11d.

MISCELLANEOUS NOTES

Bramley's Seedling Apples Wanted

THE Department of Scientific and Industrial Research invites tenders for the supply of 160 tons of Bramley's Seedling apples in minimum quantities of 10 tons, to be delivered to the Ditton Laboratory, East Malling, near Maidstone, Kent, at times to be arranged. The fruit must be of National Mark, Fancy Grade, packed in Standard bushel boxes. Tenders must reach the Superintendent, Ditton Laboratory, not later than August 14, 1935.

The Agricultural Index Number

THE June index of prices of agricultural produce was the same as in May at 111 (corresponding month of 1911-13=100), but was 1 point above that for June last year. (If allowance is made for payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act, the June index would be 117, which was also the figure in the previous month.) The principal price alterations in June were the further increases in fat cattle and potatoes, and a sharp seasonal decline in fat sheep. Store and dairy cattle appreciated a little, while porkers and store pigs were slightly cheaper.

*Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13=100.)*

Month.	1930	1931	1932	1933	1934	1935
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	—
August	135	121	105	105	119	—
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

MISCELLANEOUS NOTES

Grain.—Wheat at an average of 5s. 6d. per cwt. in June showed a further increase of 2d. and the index rose from 67 to 69. (If the "deficiency payment" under the Wheat Act, 1932, is allowed for, the index would be 114.) Oats also appreciated by 2d. per cwt. to an average of 7s. 4d., with a rise of 1 point in the index to 98, while barley remained unaltered at an average of 7s. per cwt. The index, however, moved upwards 3 points to 94 on account of a fall in price in June, 1911-13,

Live Stock.—Values for fat cattle continued to rise during the greater part of June, although there was a fall at the end of the month. The average for second quality cattle at 33s. 8d. per live cwt. was 9d. higher than for May and the index rose by 1 point to 90. (Addition of the cattle payment of 5s. per live cwt. would have the effect of raising the index to 104.) In the case of fat sheep the seasonal fall in prices was continued and second quality declined 1½d. per lb. to an average of 9d., while the index fell by 16 points to 124, as compared with a fall of 12 points to 138 in the corresponding period of 1934. Bacon pigs were very little altered either in price or index number, but pork pigs were 6d. per score cheaper and the index declined 3 points to 103. Store cattle and dairy cattle continued in good demand during June, and the former were 1s. and the latter 4s. per head dearer; in both instances the indices were 2 points higher at 92 and 100 respectively. Store sheep and pigs were cheaper on the month, sheep by 7s. 6d. and pigs by 1s. per head, and the index for sheep fell 5 points to 100, while that for pigs remained unaltered at 115.

Dairy and Poultry Produce.—There was no alteration in the regional contract price of milk in June as compared with May and the index remained at 162. Butter was a little cheaper, but there was a rise of 3 points in the index to 89, owing to a greater price decline in June of the base years, while cheese showed no change in price, although the index rose by 4 points to 98 for the same reason as in the case of butter. Eggs were appreciably dearer, the increase of 1½d. per dozen being reflected in a rise of 8 points in the index to 107, as compared with 100 a year ago. Poultry was cheaper and the index of 123 showed a decline of 2 points.

Other Commodities.—The sharp rise in the wholesale prices of potatoes which commenced in May continued

MISCELLANEOUS NOTES

also in early June, and the average increase on the month was about 27s. 6d. per ton, so that the index appreciated by 24 points to 137. In June, 1934, the index fell by 8 points to 82. Clover hay was a little dearer and index remained unchanged at 100. Wool values were higher and the index moved upwards 2 points to 85.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity	1933	1934	1935			
	June	June	Mar.	April	May	June
Wheat	80	67	62	64	67	69
Barley	94	96	95	93	91	94
Oats	77	83	96	98	97	98
Fat cattle...	95	94	88	86	89	90
„ sheep...	114	138	139	141	140	124
Bacon pigs ...	97	110	114	108	104	105
Pork „	96	113	120	113	106	103
Dairy cows ...	104	101	101	99	98	100
Store cattle ...	94	87	86	85	90	92
„ sheep	83	109	113	107	105	100
„ pigs	106	135	130	122	115	115
Eggs	102	100	94	96	99	107
Poultry	132	126	124	116	125	123
Milk	138	162	161	215	162	162
Butter	91	87	88	89	87	89
Cheese	121	108	91	91	94	98
Potatoes	80	82	108	95	113	137
Hay	69	88	103	99	100	100
Wool	63	82	83	83	83	85

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	124	120	121	119	114	114
Fat Cattle...	—	—	102	100	102	104
General Index ...	104	114	119	126	117	117

MISCELLANEOUS NOTES

Export of Breeding Stock

NUMBER and declared value of animals, living, for breeding, exported from Great Britain and Northern Ireland during 1934, with comparative figures for 1933. (From returns supplied by H.M. Customs and Excise.)

	1934		1933	
	Number	Declared Value	Number	Declared Value
CATTLE				
Argentina	145	£ 26,272	71	£ 16,115
Brazil	5	671	11	340
Italy	14	630	5	250
Netherlands	10	950	—	—
Uruguay	13	1,615	17	1,908
Venezuela	5	260	4	39
Australia	92	15,696	71	7,336
Canada	32	2,441	59	3,051
Irish Free State ...	163	4,607	316	6,546
Kenya	14	640	13	557
Southern Rhodesia ...	5	665	5	517
Palestine	14	470	—	—
Union of South Africa ...	54	3,838	50	3,698
Other Countries ...	23	1,384	44	2,050
TOTAL	589	60,139	666	42,407
SHEEP AND LAMBS				
Argentina	185	3,125	106	1,398
Chile	30	340	71	1,785
Spain	26	265	26	265
Uruguay	81	1,461	47	695
United States of America ...	40	947	—	—
Australia	52	2,560	23	1,076
Canada	18	76	17	490
Falkland Islands ...	21	500	33	617
Irish Free State ...	155	1,367	109	786
Union of South Africa ...	89	998	63	436
Other Countries ...	154	2,284	167	3,022
TOTAL	851	13,923	662	10,570
SWINE				
Brazil	4	170	17	149
France	31	387	15	191
Italy	6	155	5	92
Japan	4	231	38	539
Spain	12	147	2	25
Sweden	5	170	—	—
Australia	4	111	5	98
Canada	75	580	—	—
Irish Free State ...	70	603	44	330
Malta and Gozo ...	10	175	—	—
Other Countries ...	43	859	134	1,137
TOTAL	264	3,588	260	2,561

MISCELLANEOUS NOTES

Advisory Leaflets

SINCE the date of the list published in the May, 1935, issue of this JOURNAL (p. 201), the undermentioned Advisory Leaflets have been issued by the Ministry:—

- No. 2. Destruction of Charlock (Re-written).
- No. III. Nitrogenous Fertilizers (Revised).
- No. 129. Loganberry Cultivation (Revised).
- No. 237. The Carrion Crow.
- No. 238. Spotted Wilt of the Tomato.
- No. 239. Lime and its Uses on the Land.
- No. 240. White Clover.
- No. 241. Leaf Spot of Celery.
- No. 245. Apple and Pear Scab.
- No. 246. The Silver Leaf Disease of Fruit Trees.
- No. 247. Seed Testing.
- No. 248. Brown Rot and Allied Diseases of Plums.
- No. 249. Sainfoin.
- No. 250. Contagious Bronchitis of Poultry (Infectious laryngo-tracheitis).

Copies of any of the above-mentioned leaflets may be purchased from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or at the Sale Offices of that Department at Edinburgh, Manchester, Cardiff and Belfast, price 1d. each net (1½d. post free), or 9d. net per doz. (10d. post free).

Single copies of not more than 20 leaflets may, however, be obtained, free of charge, on application to the Ministry. Further copies beyond this limit must be purchased from H.M. Stationery Office, as above.

A list of the Ministry's publications, including leaflets, on agriculture and horticulture may be obtained free and post free on application to the Ministry.

Primary Producers' Empire Tour.—A tour of Empire farmers, horticulturists and other persons connected with industries allied to agriculture has been arranged by the British National Union to take place during the early months of next year. The date of departure has been fixed for January 10, and the party will return on May 3, thus avoiding most of the British winter. The itinerary will be all-Empire outwards via Suez, Bombay, Colombo, Fremantle, Melbourne, Sydney, across to New Zealand, where 34 days will be spent in a comprehensive visit to the North and South Islands, homewards across the Pacific, calling at Fiji, Honolulu, Vancouver, across Canada via the Rockies, Niagara, and Montreal to Liverpool. Full particulars of the tour may be obtained from the Organizing Secretary of the Union, 16, Arlington Street, London, S.W.1.

MISCELLANEOUS NOTES

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1., on Monday, July 22, 1935, the Rt. Hon. The Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Cambridgeshire and Isle of Ely.—An Order fixing special minimum rates of wages for male and female workers on harvest work during the period of the corn harvest of 1935. The rate for male workers of 21 years of age and over is a sum of £11 6s. 0d. to cover a period of four weeks of 64 hours per week (excluding Sunday) and in addition 11d. per hour for any employment on Sundays and in excess of 64 hours per week. For female workers of 18 years of age and over the rate is 8d. per hour for all time spent on the corn harvest.

Essex.—An Order fixing special minimum hourly rates of wages for male and female workers on harvest work during the corn harvest of 1935. For male workers of 21 years of age and over the minimum rate is 10d. per hour and in the case of female workers of 21 years of age and over 7d. per hour for all time worked on the harvest.

Hertfordshire.—An Order fixing special overtime rates of wages for employment during the corn harvest of 1935. The overtime rate for male workers of 21 years of age and over is 11d. per hour and for female workers of 19 years of age and over 8½d. per hour with provision for the payment of over-riding minima.

Monmouthshire.—An Order fixing minimum and overtime rates of wages for male workers and minimum rates of wages for female workers to come into force on September 16, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until March 15, 1936. The minimum rate for male workers of 21 years of age and over is 32s. (instead of 33s. as at present) per week of 54 hours in summer and 50 hours in winter. The overtime rates for adult male workers remain unchanged at 9½d. per hour on weekdays and 11½d. per hour on Sundays, Christmas Day and Boxing Day. The minimum rate for female workers of 17 years of age and over remains unchanged at 6d. per hour for all time worked.

Norfolk.—An Order fixing special minimum and overtime rates of wages for male workers employed on the corn harvest of 1935. The minimum rate for male workers of 21 years of age and over employed for the whole harvest period is £11 to cover all time spent on the harvest. Where the harvest is worked by the month, this period is defined as 24 working days (excluding Sundays) and the hours of work are not to exceed 64 (instead of 70 as in 1934) during any week of this period. For male workers who are not employed for the full period, special differential rates are proposed for all overtime employment on the corn harvest, the rate for male workers of 21 years of age and over being 9½d. per hour.

Suffolk.—An Order fixing special minimum rates of wages for male workers employed on the corn harvest of 1935. The rate for male workers of 21 years of age and over employed on harvest work throughout the harvest period on farms of at least 60 acres of corn is not less than the ordinary minimum rate otherwise applicable, with in addition a bonus of £5 payable on completion of the harvest period. The hours of work in respect of which this rate is payable are 11½ on any weekday while harvest work is in progress. For workers of 21 years of age and over who do

APPOINTMENTS

not work on harvest work throughout the harvest period or who are employed on farms of less than 60 acres of corn, the rate is 10d. per hour for all employment on harvest work.

Enforcement of Minimum Rates of Wages.—During the month ending July 14, 1935, legal proceedings were taken against eight employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area.	Court.	Fines imposed.	Costs allowed.	Arrears of wages ordered.	No. of workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Lincs., Holland ...	Spalding ...	10 0 0	1 15 0	12 5 10	3*
Yorks, West Riding	Sheffield ...	5 0 0	5 0 0	51 5 9	1
Devon ...	Tavistock	5 0 0	†	9 2 8	1
Oxford ...	Chipping Norton	5 0 0	‡	16 15 3	1
Huntingdon ...	Ramsey ...	10 0	—	6 9 4	1
" ...	"	10 0	—	8 5 10	1
" ...	"	1 0 0	—	16 6 5	1
Hereford ...	Ledbury ...	3 10 0	1 7 6	25 0 0	5
		£ 30 10 0	8 2 6	145 11 1	14

* Case of one worker dismissed.

† Case noted as adjourned in previous report.

‡ Costs included in fine.

Foot-and-Mouth Disease.—There has been no outbreak of Foot-and-Mouth disease confirmed since June 20 last, when outbreaks occurred at Rochdale, Lancs. All movement restrictions in connexion with those outbreaks were withdrawn on July 18, and at the time this issue of the JOURNAL went to press, no part of Great Britain was subject to general movement restrictions on account of the disease.

APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS

ENGLAND

Devonshire.—Miss E. M. Bartle, B.Sc. (Dairying), N.D.D., Miss D. J. Corfield, N.D.D., U.D.D., and Miss E. M. Lloyd, N.D.D., B.D.F.D., have been appointed Instructors in Rural Science (Dairying and Poultry-keeping).

Mr. F. Baxter has been appointed Temporary Assistant Horticultural Instructor, *vice* Mr. P. H. Brown.

WALES

Monmouthshire.—Mr. C. H. King has been appointed County Poultry Adviser, *vice* Mr. Keith Wilson, N.D.P.

Miss J. E. Oliver, Rural Domestic Science Instructor, has resigned.

STAFFS OF AGRICULTURAL COLLEGES

Midland Agricultural College, Sutton Bonington.—Mr. G. F. Kingston, M.A., has been appointed Senior Lecturer in Agriculture and Farm Director, *vice* Mr. H. G. Robinson, M.Sc., appointed Principal of the College.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended July 17				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
„ „ Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20·6%) ..	7 5d	7 5d	7 5d	7 5d	7 0
Calcium cyanamide (N. 20·6%)	7 5e	7 5e	7 5e	7 5e	7 0
Kainit (Pot. 14%) ..	3 0	2 14	2 12	2 14g	3 10
Potash salts (Pot. 30%) ..	4 11	4 6	4 4	4 6g	2 10
„ (Pot. 20%) ..	3 12	3 6	3 3	3 6g	3 4
Muriate of potash (Pot. 50%)	7 4	6 16	6 12	6 16g	2 9
Sulphate „ „ (Pot. 48%)	8 3	7 18	7 12	7 18g	3 3
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
„ (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26·27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16k	3 6
„ (S.P.A. 13½%) ..	2 15	2 11	2 15f	2 12k	3 10
Bone meal (N. 3½%, P.A. 20½%)	..	6 17	6 15f	6 7	..
Steamed bone-flour (N. ½%, P.A. 27½-29½%) ..	5 12	5 12	5 10f	5 10	..

Abbreviations ; N. = Nitrogen ; P.A. = Phosphoric Acid ; S.P.A. = Soluble Phosphoric Acid ; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

§ Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater ; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails ; southern rails 2s. 6d. extra.

k Prices shown are f.o.r. northern rails ; southern rails, 1s. 3d. extra.

NOTICES OF BOOKS

Wireless Talks to Farmers in August

<i>Date : August</i>	<i>Station</i>	<i>Time</i>	<i>Speaker</i>	<i>Subject</i>
1	North	10.10 p.m.	Not yet decided	Eye - witness account of the Royal Lancashire Agricultural Show
15	"	2.45 p.m.	Mr. George Aitchison, Mr. Valentine Allen	Running commentaries on the Vale of Rydal Sheep Dog Trials and Hound Trail
15	"	9.15 p.m.		From Rydal Fell to Troutbeck. Mr. Harry Hopeful as compere will introduce shepherds, farmers, sheep dog trainers and others assembled at the Queen's Arms Inn, Troutbeck
7	Scottish	8. 0 p.m.	Mr. John James Miller	Eye - witness account of the Scottish International Sheep Dog Trials at Helensburgh
5	West	8.45 p.m.	Mr. T. Dunn	The Pannier Market, Barnstaple
29	"	7.35 p.m.	Various	Down on the Farm (2) : An Outside Broadcast from Mr. Norman Pearce's Farm at Long Ashton

NOTICES OF BOOKS

English Earth. By Marjorie Hessel Tiltman. Pp. 325 and 34 Figs. (London: George G. Harrap & Co. Ltd. 1935. Price 10s. 6d.)

Mrs. Tiltman has produced a book on the English countryside which is well worth reading. It brings together in one review the modern tendencies in British agriculture. Very little is missed by the author's keen and sympathetic eye. It is not that she claims long acquaintance with the soil and the industries carried out on it, but what she does is to select with unerring insight the salient features of new trends, new developments and new industries. Take, for example, her chapter on "The Wine of Old—and New—England." In that she reviews the awakened cider industry of this country, and shows how the Government's action in providing home-brewed cider with a National Mark has given an altogether new life to the industry: how the public are beginning again to appreciate that the cider vintage is the wine of this country and should be as precious to them as many of the vintages in France are to the French. "British Beef is Best" is another piece of painstaking analysis. The reviews

NOTICES OF BOOKS

are necessarily sketchy, but they do touch the vital spots of to-day's agriculture and horticulture, and as such they will be read with interest by those who are trying to make a living out of the land or through one or other of its by-industries. Poultry production, canning, and market gardening under glass and otherwise, are all dealt with, so that the book should make a wide appeal.

The Battle for Democracy. By Rexford G. Tugwell. Pp. vi + 330. (New York: Columbia University Press. London: Milford. 1935. Price 15s.)

The subject of this book is the philosophy of the "New Deal," and in it Professor Tugwell speaks, for the most part, as an economist and social theorist rather than as Under Secretary of Agriculture in Mr. Roosevelt's Administration. The nature of his thesis is evident from his title. The threat to democracy arises from the growth of large-scale industry and the dominance of the acquisitive motive in American life. Its salvation is not to be sought along the lines of the anti-Trust Laws, in the attempt to enforce competition and so to preserve outmoded forms of economic organization, but in the growth of industrial co-operation and self-discipline. The instruments of this co-operation are the codes and agreements of the National Recovery Administration and Agricultural Adjustment Administration prepared (or so it was intended) by the industries themselves and submitted for approval and enforcement to the Government as "Senior partner in industry." From such co-operation will emerge a co-ordinated planning of production in a spirit of social service. Industry will be enabled to make full use of its productive capacities, while avoiding the disastrous wastes and maldistribution of purchasing power that result from excessive capitalization.

Meanwhile the agricultural measures of the recovery programme involve the limitation of production in face of a shrunken demand; the effort to increase agricultural exports by permitting the expansion of manufactured imports; and the planning of the use of land so as to eliminate the cultivation of sub-marginal areas, and to minimize the loss caused by soil erosion and predatory cultivation.

It will be evident that from Professor Tugwell's book much more can be learned of the purposes of the "New Deal" than from the reports of newspaper correspondents. Yet in spite of the author's manifest sincerity and enthusiasm, his book is on the whole a disappointment. Its social and economic theories are sketched rather than argued, and there is no attempt to come to grips with the administrative detail of the programme or with the practical difficulties which it has encountered. In spite of its three hundred pages the book contains no references, for example, to Trade Unions or collective bargaining. This tends to create the impression that the author is a romantic social idealist rather than, on the one hand, a practical statesman or, on the other, an analytical thinker. Some of these complaints no doubt disappear on the reflection that sustained argument is not to be expected from a collection of reprinted papers and addresses; while the remainder are inevitable with a book whose purpose is propagandist and whose author was obliged to observe the restraints to which the utterances of politicians must always be subject.

The Influence of Soy Bean Cake upon Milk Production and the Quality of Butter. By E. Takahashi, K. Iguchi, K. Mitamura and K. Shirahama. Pp. 66. (London: K. Nagata, South Manchuria Railway Co., 215, Goldhurst Terrace, N.W.6.)

This brochure makes a considerable addition to the nutritional literature of the Soya Bean. Soya Bean Cake approximating to a million and a half tons is exported annually from Manchuria to Japan, but its utilization in Japan is undergoing change; formerly used as manure, it is now increasingly fed to animals. The West has had

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experience of this food since 1909, and, naturally, Japanese investigators turned to Western literature, to find, however, among much else, certain unexplained differences in results from its use as a food for dairy cows. As a result, experiments extending from September, 1931, till April, 1933, were designed, and an account of them is given in these pages. Already under the same scheme of investigation publications have been issued on Soya Bean Cake as a food for poultry, swine and beef cattle. Briefly, the following conclusions were reached. The increase of Soya Bean Cake from 20 per cent. to 35 per cent., and again to 50 per cent., of the total starch value of the production ration is accompanied by increases in the total milk secreted, and no marked difference could be seen in the quality of the milk or in the physiological condition of the cows. When the cake was used at 50 per cent. of the starch value the butter produced was soft and of inferior quality to that from "control" milk. The softness of the butter can be avoided by using other meals tending to produce hard butter along with Soya Bean Cake. When butter production is the object the Soya Bean Cake should be kept under 35 per cent. of the total starch value of the production ration and should be used in conjunction with cakes of a hardening tendency. The authors point to the advantage of lowering the fat content of Manchurian Soya Bean Cake by more efficient extraction to prevent the softening of butter fat. In the prevailing tendency of the British industry, where the volume used as liquid milk is mounting and butter making is declining, it is the first of these conclusions that will arouse the most practical interest. In spite of the language difficulty, the pamphlet is very well written and well produced.

The Evolution of the British Pig: Past, Present and Future.

By G. W. Layley and W. J. Malden. Pp. xvi + 119 and 48 Figs. (London: John Bale, Sons & Danielsson, Ltd. 1935. Price 7s.)

The book is in two parts, the first given up to generalization over a wide range of subject and the second to an analysis of British breeds. The main theme is that Eastern influence is the source of all evil in our pigs and that breeders should return, as indeed the authors state they are returning, to the characters of the native stocks. This thesis is itself controversial; all the more need therefore to adduce proof, but the authors never get beyond statement and re-statement. The analysis of breeds is rather better, but we are left completely befogged as to the reason for the sequence of the illustrations. We should have been spared, too, the recapitulation of most of part one as *obiter dicta* in part two. The idiom employed by the authors is never easy.

L'agriculture à travers les âges: Histoire des faits, des institutions, de la pensée et des doctrines économiques et sociales (*Agriculture through the Ages*). By Emile Savoy. Preface by the Marquis de Vogüé. Some Problems of Social Economy: Prolegomena. Pp. xvi + 667. (Paris: E. de Boccard, 1 rue de Medicis. 1935.)

The author of this book, volume one of an encyclopædic work that has been planned to cover the history of farming throughout the ages, is a State Counsellor and a member of the Executive Committee of the Swiss Peasant Union. He is already well known as a writer on historical and economic subjects; and the wide scope of his present work is sufficiently indicated in its sub-title.

The subject is divided into four main periods. The first begins at about 2,000 years before the Christian era, and ends with the fall of the Roman Empire, A.D. 475; the second, beginning with the 6th century, ends with the 17th; the third includes the 18th and 19th centuries and the first few years of the 20th up to the War; and finally, the last period includes the War and the post-War years. These four periods correspond approximately to the traditional

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definition of general history which is universally agreed upon:—Antiquity, the Middle Ages, the Modern Epoch, and the Contemporary Epoch.

The first volume, which has just appeared, contains the prolegomena. It is an extremely clear discussion of some of the problems of social economy; production, distribution, and consumption; the circulation of money; farming in its relation to social questions and to civilization. The agricultural factor is of the first importance in the life of all the races of men. Its influence is primary, but as M. Savoy points out, historians have occupied themselves comparatively little with the subject, which is a fact worthy of emphatic notice. M. Savoy has undertaken to supply this lacuna in our knowledge, and the careful consideration he has given in this first volume to the various influences, physical and psychological, that have affected the development of farming throughout the world, is a promise that when it is completed his history will do no less than fulfil the plan he has made.

Farm Wiring. By C. A. Cameron Brown. Pp. 32. Illus. (Oxford: Institute for Research in Agricultural Engineering. 1935. Price 1s.)

This is the third Bulletin on phases of the use of electricity in farming issued by the Institute for Research in Agricultural Engineering. The first two dealt with soil heating by electricity and pumping by electricity respectively, and the third maintains the high standard of usefulness set by its predecessors.

The author advises against what may be called "home wiring," because he maintains that few amateurs can possess the technical knowledge necessary to the installation of an electrical system, efficient in the difficult and trying circumstances of the farm, and safe both from the point of view of the system and the user. This does not prevent him from providing a very clear and simple exposition of his subject, which explains much that otherwise might prove of insuperable difficulty in the way of further development in the application of electricity as motive power on the farm.

The various types of cables and their advantages are described, and the methods to be adopted in using them, with the considerations that should be taken into account in making a choice between systems. The necessity for earthing and leakage protection are discussed, and the Bulletin is completed by some general remarks. It should be of considerable assistance in guiding those farmers who are now taking advantage of the supply of electricity as it becomes increasingly available.

Ornamental Shrubs: their Selection and Pruning. By A. J. Sweet. Pp. xiii + 63, and 35 Figs. (London: J. M. Dent & Sons, Ltd. 1935. Price 5s.)

Practical experience, gained on the cultivation of the more uncommon forms of ornamental shrubs in the famous Aldenham House gardens, has rendered the author well qualified to write a practical handbook. Most of the text is devoted to pruning, a problem that frequently perplexes the amateur gardener, who will find these notes very useful, especially where they touch upon shrubs rarely encountered in England and about which information is scarce. The notes on the choice of shrubs contain many suggestive hints and deserve more extensive treatment than the very brief form in which they are given; and the system of classifying shrubs according to the methods of pruning, while it successfully avoids unnecessary repetition, requires a fuller index to facilitate quick reference. The book contains a number of line drawings, most of which are successful in clarifying the points they are intended to illustrate. It is hoped that the book will be sufficiently well received to encourage the author to write a fuller treatise, but in the present volume condensation has been the aim and is successfully achieved, the value of the informa-

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tion included being high in proportion to the moderate price at which the book is issued.

Economics of the Farm Business. By Professor Theodor Brinkmann. English translation with Introduction and Notes by E. T. Benedict, H. H. Stippler and M. R. Benedict. Pp. x + 172. (Berkeley, California, U.S.A.: University of California Press. Price 9s.)

This treatise on farm economics contains a careful analysis of the different influences that determine the uses to which any particular agricultural land must be put if the maximum net returns are to be obtained. The study emphasizes the great complexity of the problems that must be solved if farm management is to make the most of its opportunities. It is true that, where the possible permutations among the causal factors are so many and their incidence so unpredictable, their study must be largely of theoretical interest, but this does not detract from the practical value of the book. It will help farmers and others to understand some of the underlying economic forces with which they have to deal, and to understand a situation is the first step to mastering it.

The method which the author has adopted is to apply the law of diminishing returns to each factor in turn. This has the very desirable effect of bringing out the fundamental character of this law which is so often neglected by agricultural journalists to-day. Many readers will regret that a more specifically mathematical treatment is not used in places; an appendix of this nature would have helped to make clear many things that remain obscure in the text. The English version often attempts to keep too close to the German original where a bolder translation would have been much better; for this reason also a parallel mathematical treatment would have been valuable. One or two apparent slips are, no doubt, due to the imprecise use of words. The equation on page 3, for instance, seems to have taken account twice of the element of capital, but probably C should be taken to indicate working capital; even so, there seems to be no good reason for capitalizing the amount of C and not of M. This kind of obscurity, which is particularly apt to occur in translations, should be avoidable by careful definition of the terms used.

The two main sections of the book deal with the factors governing the intensity of cultivation and systems of farming under different circumstances of time and place. The analysis is very thorough and is by no means limited to the mere classification that some writers are pleased to call analysis. In one instance only does the author appear to have neglected one of a pair of counterbalancing tendencies. The publishers are to be congratulated on making available in English this interesting and instructive work which will, no doubt, be read with profit by all English-speaking students of farm economics.

The Diseases and Curing of Cacao. By H. R. Briton-Jones, D.Sc., Ph.D., D.I.C., A.R.C.S. Pp. x + 161 and 37 Figs. (London: Macmillan & Co., Ltd. 1934. Price 10s.)

This book, which is intended chiefly for the use of agricultural officers and cacao planters, is a compilation, in compact and useful form, of all the available information on diseases of cacao due to plant parasites. There is also added a chapter on the preparation or "curing" of cacao. Detailed technical descriptions of the parasites are not given, but there are full descriptions of the symptoms of disease and macroscopic characteristics of the fungi concerned, with excellent reproductions of photographs from various sources. The author stresses his point of view that in a large number of instances disease can be controlled by modifying agricultural practices in such a manner as to bring about conditions that are within the range of tolerance of the host and outside that of the parasite. The practical presentation should make the book a valuable help to those

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who in any part of the world have to do with the growing of cacao. A very full bibliography is included.

Broad Acres: A Quarterly Journal of Agricultural Education in Yorkshire. Vol. I, No. 1. Pp. 33. (Leeds: The University. January, 1935.)

The first issue of a new Quarterly Journal devoted to agricultural education in Yorkshire has recently been published by the Yorkshire Council for Agricultural Education and the Department of Agriculture, Leeds University. "Broad Acres"! A happy title! Beneath its green jacket is a broad-mindedness that is refreshing even in these days of broadcast agricultural news. Sir Percy Jackson, Chairman of the Council, gives a hint of new pastures in a foreword when he commends it to anyone "who intends keeping in close touch with the science of his profession and the social side of his industry." He commends it as a "ready help and wise companion." Too often agricultural literature is designed to assist the established farmer, and is devoted mainly to questions of technique, politics and the like. Such publications are essential for the proper appreciation of modern agricultural conditions, but there is an ever-increasing public interested in the æsthetic aspects of the countryside, and in learning how the countryman plays his part in the general welfare. The urban dweller is more than ever before finding a new interest in rural affairs. To meet this need we require informative articles infused with a certain amount of enthusiasm and cordiality. "Broad Acres" may well help to cement the many friendships between urban and rural interests in that warm-hearted county. While remembering old friends, the making of new ones is of equal importance, and a journal that not only gives advice to those of us whose hearts are already on the farm, but serves to guide the young farmer and many who are still at school, should prove invaluable. Subjects of daily importance are drawn upon for purposes of illustration, for the creation and maintenance of interest, and for relating the three R's to the world around us. "Broad Acres" will appeal to all who are interested in aiding young people to arrive at a proper appreciation of the countryside and its life.

Poultry Ailments. By W. P. Blount, F.R.C.V.S. Introd. by C. Crowther, M.A., Ph.D. Pp. x + 306, and 29 Figs. (London: Poultry World, Ltd. 1934. Price 5s.)

The early chapters of this volume deal with the anatomy and, to a larger extent, the physiology of the fowl. Interesting chapters follow, in which various aspects of poultry keeping, such as rearing, culling and dietetics, are discussed, and articles on the transmission of disease and disinfection are included. Diseases are dealt with in Part II, the subjects being arranged alphabetically, which may not be an advantage to the reader. Diseases caused by bacteria are mixed with internal and external parasitic infestations, injuries, and conditions resulting from dietetic errors, etc.

The articles are well written in the light of our present knowledge and will be very useful for those interested in poultry and their diseases. A glossary is appended for the benefit of poultry owners who may not be familiar with some of the more technical terms. The publishers' work has been carried out very creditably.

Economics with Application to Agriculture. By E. F. Dummeier, Ph.D., and R. B. Heflebower, Ph.D. Pp. x + 742. (London: McGraw-Hill Book Company, Ltd. 1934. Price 22s. 6d.)

In the thirty chapters comprised in this volume an attempt is made to show the relation of the principles of economics to recent and current economic events in a more concrete and effective manner than has been done in earlier textbooks. As its size indicates, the book is concrete enough, but loses much of its effectiveness in attempting to cover so much ground, and more particularly in its method of presentation. It is intended primarily for use as a textbook in American

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colleges where agriculture forms part of the curriculum; but it goes beyond that. It has a wider appeal, and the authors are ambitious in their effort to combine a treatment of the theoretical principles of economics with discussions of practical agricultural problems and numerous references to the industrial field. On account of the inevitable divergence of the lines of development of the economic theory and of the agricultural problems treated, the material is presented somewhat disjointedly and lacks the essentials of a textbook—compactness and drive.

After a brief historical introduction, the authors proceed from the consideration of general economic and monetary principles to problems of applied economics, but the transition is not clear. Adam Smith, Ricardo and G. F. Warren are rather jostled by price lags, demand curves for meat by hypothetical families, and the farm price of hay in Nebraska and Ohio. Similarly, a chapter on Farm Organization intervenes between the chapter on Principles of Trade and Production and that on Exchange Value and the Market. It would perhaps have been clearer to the student and more acceptable to the graduate if the basic economic principles had formed a separate part of the book as a platform from which the various analytical discussions of practical problems might have sprung. But a graver fault of the wide aims of the authors is that there is more than a tendency to confuse, or at any rate, merge economics with politics and social policy. This is particularly noticeable in reading the last four chapters, where discussion of social policy, and in particular of the New Deal, is especially weak from the point of view of economic analysis. For example, in dealing with Rural and Urban Prosperity, the authors ask how the income of the farm population compares with that of city workers. They inquire whether rural and urban prosperity are each necessary to the other. In answering these questions, many facts are marshalled together and presented with some force. The authors' conclusion is that industry has a political interest in giving to the agricultural element a return for its labour not unduly unfavourable in comparison with the return to the urban element. They remind their readers that Rome profited for many years from the merciless exploitation of the rural provinces, but that finally the crushed, overtaxed and exploited provinces added their wrath to that of the invading barbarians and the day of the Imperial City was done. America might still learn from this a lesson in social justice. The authors might have succeeded better in their primary intention had they restricted themselves more closely to an analytical treatment, even at the expense of the more popular appeal.

As a textbook, however, a wealth of information is provided. The authors rightly emphasize the value of statistics and full use is made of them in this book, though in some instances the explanation of the underlying factors determining them is not fully developed. One would have thought, for example, that the importance of the agricultural depression in America would have demanded a full treatment of the underlying problem of maladjustment of supply and demand, thus providing an excellent opportunity to illustrate certain basic economic principles. Instead, the statistics lead to a discussion of the interaction of rural and urban prosperity with the menacing moral mentioned above. The chapters on money and credit, price-level movements, labour and wages, capital and interest, are all good of their kind. In connexion with current events and discussion in this country the chapters on monopoly in agriculture, on marketing, and on land utilization are of interest. There is, later in the book, an account of the recent legislation to combat the depression, but there is little critical discussion and only vague references to the underlying factors of the situation.

The authors foresee increasing intervention by Government in the social control of economic life according to the needs of the situation. 'Sometimes Government will cease to assume new regulatory powers; at other times, it may even withdraw from previously assumed

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activities; but at all times, Government must show increasing intelligence, must learn to work out integrated plans, and to develop a technique of control which will preserve the main asset of the old order, namely freedom of choice by men both as consumers and as producers.

Each chapter ends with suggestions for further reading, and the index is adequate.

Education for Life: A Country School Experiment. By A. A. Matthews. Pp. 112 and 12 Figs. (London: Thomas Nelson & Sons, Ltd. 1935. Price 2s. 6d.)

Surely, it is only the time factor that delays the general adoption of the new principle of giving reality to teaching by the use of the environment; of ensuring to the children that, when they leave school, the things they have learnt will be of use to them in life. In the process of adoption there has come the realization that the country school is at less of a disadvantage than its urban counterpart than was formerly thought, for the country school stands close, closer than the town school, to life and living processes. The label of "Rural Bias" which has become the shorthand of the new education for the countryside might be forgotten for ever, but it will serve, if only this once, to give position to the little volume under review. Many hear of these new projects from the theoretical distance, but sigh for the knowledge of how they work in practice. "Education for Life" affords an answer and should set the seal on many conversions. It is the testimony of one headmaster of a school serving "a large scattered country district in the West Midlands." Eight years of experiment are covered with the School Garden and, in the order of their coming, The Poultry Club, The Rabbit Club, The Calf Club, The Lamb Club, The Pig Club, and Bee-keeping; School Meals, Boots, and Clothing; and all the reactions of these ventures on the school. The book is simply written, concrete, authentic, and out of these qualities carries the intangible, unintentional something that is called romance. It is hoped that it will reach and be read by most of those who are directly concerned with education in country districts or less directly with movements for the improvement of the life of the countryside. The publishers have done their part by putting excellent work into the production at a very reasonable price.

The Sociological Background of Adult Education in Rural Districts. By A. W. Ashby. Pp. 27. (London: British Institute of Adult Education, 39, Bedford Square, W.C.1. 1935. Price 6d.)

During the last decade and a half these islands have entered upon a new phase of the secular rural problem. Agricultural history is in the making. The material transition is from a long rise, and finally overwhelming predominance, of industry in the national economy to a position in which the necessity of redressing the balance is being enforced from without and within. A change of thought preceded and accompanies the material change. Perhaps it is only in retrospect that we become fully aware of the extent of the difference between the rural and urban populations, between agriculture and industry. Their separateness should disappear.

The new thought tends to recognize the fundamental unity of town and country, and Professor Ashby's contribution to this aspect of the relationship is at once timely and important. His pamphlet is an analysis of migration and quality of the rural population, types of rural community, the rural community and the individual, and mental characteristics and attitudes in the rural population, with a synthetic note on the functions of adult education. The opening pages are devoted to a cool and detached dissection of the subject, and there will be few readers professionally or otherwise interested in rural questions who will not find some prepossession or pet theory to be

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tenable no longer. We have to accept things as they are, and sociological advance is dependent, both in the rural and urban population, on the development of the individual. There is no escape from the root meaning of the verb "educate." Finally, in part five, where functions are discussed, the objective is shown to be, not the creation of a separate social order for the country, but amalgamation into the general order with a progressively higher standard of living. On Professor Ashby's argument it is inevitable.

The pamphlet deserves to be read by as large a public as possible. It is difficult reading if only because the author has failed to maintain an even balance between analysis and synthesis. After following the process of demolition we look not only for the plan, but for something at least approaching the spaciousness of the new edifice. Apart from that, the conclusions are not always clearly expressed, e.g., "Conditions as regards material ambitions vary to some extent with the economic and social elasticity, the degrees of vertical-social and geographical-horizontal mobility, in the communities in which children, adolescents and young adults live." The confiding reader feels that he is being "sent over the pavilion for six." The effort to follow Professor Ashby, however, is well worth while in the end.

The Soya Bean: Its History, Cultivation (in England) and Uses. By Elizabeth Bowdidge. With a Foreword by Sir John Davies. Pp. xii + 81, illustrated. (Oxford University Press, London: Humphrey Milford, 1935. Price 6s.)

The manifold uses of the soya bean have led to attempts to cultivate it in most Continental countries, and for some years past small-scale experiments have been conducted by Mr. J. L. North, late Curator of the Royal Botanic Society of London, towards developing a variety suitable for cultivation in this country.

Since 1932, experiments on a field scale have been carried out by Fordson Estates, Ltd., at Boreham, Essex, with seed obtained from various countries as well as with four varieties produced by Mr. North. The course of these experiments is carefully described in this book. The methods of cultivation are explained in detail. The yields obtained in the 1934 experiment varied between 15 bu. and 25 bu. per acre, according to variety, and this compares not unfavourably with yields obtained in America. It must, however, be borne in mind that the seasons of 1933 and 1934 were especially favourable to the growth of the crop, and further experience over a period of years of different meteorological conditions is necessary before a final conclusion as to the consistency of these yields in this country. It is suggested by the author that no variety of soya bean has any chance of success in England unless it matures in less than 100 days in America. Varieties requiring this length of time in America need nearly a month more in this country, and owing to our colder spring weather, no advantage is gained by earlier sowing. Mr. North's seeds require 124-127 days to reach maturity in England, but, if grown in America, they would require only 85-90 days.

Another factor that has been shown by experiments in America to play an important part in the development and chemical composition of the soya bean is the length of day prevailing in the district where it is sown. This crop is shown by these experiments to be definitely a "short-day" plant. Normal day (15 hours) plants took 88 days to reach the stage of blossoming, while 7-hour and 12-hour day plants had by that time matured their seed. These blossomed when 31-32 days old. Sowing in this country in the beginning of May would give the plant a 15-hour day increasing to a 17-hour day on June 21.

It is unlikely that the soya bean will ever be used for human food in this country, which is so consistently devoted to wheat as a bread stuff; and some doubt may be felt as to its use as a fodder crop in the form of hay; but if the crop can be successfully and economically cultivated its industrial uses alone would justify its introduction into the rotations of British farming.

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The price obtained for the crop is stated to vary widely from month to month. In August, 1925, a peak of £14 12s. 6d. per ton was reached, but in December, 1933, it fell to £5 17s. 6d.

On the basis of the yields given in this volume, and with this range of price variation in view, the British farmer will have to decide whether he can regard the crop as a profitable undertaking at the present time.

The Gramineæ: A Study of Cereal, Bamboo and Grass. By Agnes Arber, M.A., D.Sc. Pp. xviii + 480. 1 Plate + 212 Figs. (Cambridge: University Press. 1934. Price 30s.).

In recent years, several works dealing with various aspects of the Gramineæ or grasses have appeared, but none has been more welcome than Dr. Arber's scholarly account of this exceedingly important family. The author points out that the grasses form so vast a group that to gather and correlate all the information accumulated by botanists and others would fill a library rather than a single volume. On this account she has wisely selected from those sections of the subject that appealed to her personally and that have not been dealt with in modern works. Thus, references to the ecology of grasses are incidental only, whilst their taxonomy is represented by a systematic table of the genera referred to in the course of the work. A considerable portion of the volume is for the advanced student and teacher, although the layman will undoubtedly find much of general interest, and his knowledge of the family will be greatly increased the more deeply he delves into its pages.

For convenience the book may be divided into six sections. In the first portion the grass family is treated in its relation to man. Two chapters are devoted to the historical aspect and origin of the cereals, together with a concise account of the more important kinds, including wheat, barley, oats, maize, rice and sorghums. This is followed by a chapter, "Pasture, sugar and scent," in which is considered the application of grasses for grazing purposes, sugar-yielding grasses such as sugar-cane, and finally the essential oil grasses, comprising those from which Vetiver, Citronella and Lemon Grass Oils are extracted. The second section is occupied by four chapters on one of the most fascinating, yet still imperfectly known, groups of grasses—the bamboos. This embodies a considerable amount of detailed research on the structure of the spikelets, special reference to the meaning of the tree habit, a discussion on the periodicity of flowering, and the strange phenomenon of gregarious flowering whereby whole forests of bamboos are eliminated. The third and major part of the book is devoted to a consideration of the grass plant in all its stages of development, together with a comprehensive study of the structure of the vegetative and reproductive organs. The last three sections deal with distribution and dispersal, two putative hybrids, and pattern and rhythm in the Gramineæ. In the chapter on distribution and dispersal the author has brought together numerous facts connected with the methods by which the spread of grasses has been and is being effected. Maize and Townsend's Cord Grass are described in detail, and evidence is given as to their probable hybrid origin, although the evidence in the former case is not conclusive. The final chapter is an attempt to trace out the "pattern and rhythm" running through grasses which makes them so readily recognizable as a distinct entity. Examples of parallelism are given, not only between species in different genera of grasses, but also between grasses and other plants.

This work is profusely illustrated with more than two hundred line drawings by the author. The bibliography is limited to the titles of papers cited in the text, but nevertheless occupies nearly forty-five pages, and should prove most useful to those engaged in special lines of research. In conclusion, Dr. Arber must be congratulated on her valuable contribution to our knowledge of the group of plants which have been so aptly described as the basis and wealth of civilization.

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The Agricultural Register, 1934-5. Ed. by C. S. Orwin. Pp. viii + 391. (Oxford: Agricultural Economics Research Institute. Price 5s.)

The first issue of this Register last year rapidly established itself as a standard book of reference on current agricultural affairs. Its preparation and publication by the Institute sufficed to ensure that it would have a prestige all its own; and the second issue, which has now been published and which covers the year 1934-5, is even more useful than its predecessor. The scope of the Register has been enlarged to deal with the whole of the United Kingdom.

The book is divided into seven parts. The first two comprise respectively a short review of the field and the legislation concerning agriculture that came into force in 1934, including Northern Ireland Acts. Parts III and IV deal with the working out of the Government's policy concerning imports and home production. Part III gives a brief account of the history and scope of trade agreements and quantitative regulation. Of particular interest in Part IV, which is entitled "Administrative Action," are the full accounts of the year's working of all marketing schemes; and this Part also describes the operations of the Import Duties Advisory Committee and various other statutory Committees, and the administration of the subsidies on milk, fat cattle, wheat and sugar-beet.

The next two parts, entitled "Supplies and Prices" and "Statistics" are, naturally, mainly statistical. Part VII is concerned with the terms and conditions of employment of agricultural labour; and a final part contains information on tithe, credit, land settlement, water supplies, foot-and-mouth disease, the Road and Rail Traffic Act, 1933, &c., that can only with difficulty be obtained elsewhere in a concise form. An Appendix contains a list of Statutory Rules and Orders of general agricultural interest made during 1934.

The foregoing summary of the contents of this book is probably a better recommendation for it than any superlatives of a reviewer. It is, nowadays, almost impossible for anyone to remain in touch with—or even realize—all the features of agricultural development. The *Agricultural Register* is the encyclopædia of current agricultural events; it must find a place on the bookshelf—and the desk—not only of the student and administrator, but of everyone who takes an intelligent and active interest in agricultural policy and achievement.

The Pace of Progress. By Sir Daniel Hall, K.C.B., LL.D., D.Sc., F.R.S. Pp. 42. (Cambridge: University Press. 1935. Price 1s. 6d.)

The cardinal economic fact and problem in the post-war world is the maladjustment of production; we have lost control, temporarily at least, of science and the machine. As Sir Daniel points out in his Rede Lecture delivered before the University of Cambridge last March, and here reprinted: "The pace of material progress has become so rapid that the social structure of the nations cannot adjust itself quickly enough to assimilate the advances." The growing of food and raw materials engages the bulk of the world's population, and as science has invaded the agricultural and industrial processes impartially the depression has been general. The alleviating political action that ensued in sixty or seventy independent countries has all been inspired by the desire to maintain the peasant structure of society, especially in European States, and the result is a variety of political expedients to slow down the rate of change. Our own policy, still in formation for agriculture, affords control by the industry itself combined with a great measure of freedom for the producer within it. The lecture ends on a characteristic note: the tempo of human and political change will have to be approximated to that of scientific and material advance. This publication offers in short compass, a review of the agricultural political trends of to-day, and not its least service is that it gives, as from a vantage point, an explanation of what is happening all along the line, especially to those whose experience is limited to a narrow sector.

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NOTES FOR THE MONTH

New or Old Seed for Autumn-sown Field Beans?

THE following note has been communicated by Messrs. F. H. Garner, M.A., and H. G. Sanders, M.A., Ph.D., of the School of Agriculture, Cambridge:—

All farmers are aware of the great difference in appearance and in feeding qualities between old and new beans. It is very generally recognized that beans are not usually safe to feed until after the Christmas following their harvesting. In addition to maturation changes, beans lose moisture during the autumn, a process of considerable importance since they are usually stacked in a damp condition; except after a very dry harvest new beans cannot be ground. There is, in consequence, a considerable difference in feeding value between new and year-old beans during the autumn, a difference which is sometimes assessed at as high a figure as £2 per ton.

Whilst the position as regards food value is clear, that as regards value for seed purposes is obscure, and practice varies considerably throughout the country. Some farmers save a stack of beans for a year in order that they may sow old seed; on the other hand, some farmers thresh a few new beans immediately after harvest specially for seed. Where such confusion exists there is obvious need for inquiry, and experiments have been conducted on the University Farm, Cambridge, to compare the value, for seed purposes, of new and one-year-old beans from the same source. All the experiments were field-scale trials, the seed being drilled and the crop treated in the normal manner, except that at harvest the bean plants were pulled and detailed studies were made of them.

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The first experiment was during the year 1931-32 and was of rather an exploratory nature; the same setting of the drill was used for both types, and this resulted in the sowing of 28 per cent. more beans per acre of old (i.e., smaller) seed than of the new. This difference in seed-rate dominated the experiment throughout, and although the old seed gave 11 per cent. higher yield the difference was undoubtedly ascribable to seed rate; by modern statistical methods it is possible to make allowance for the difference in seed rate, and when that was done it was seen that the new seed had, in fact, yielded slightly better.

In the following two years efforts were made, with fair success, to adjust the drill so that equal numbers of old and new seed were sown per acre. In addition, the experiments were more extensive, because they embraced new and old seed of two distinct strains (common field beans from Northamptonshire and a Cambridge selection); further, in the final year both strains were sown at seed rates of two and three bushels per acre, so that in that year there were four separate and distinct comparisons of old and new seed.

In the 1932-33 experiment new seed gave a definitely higher yield than old seed, the difference in its favour being slightly over 10 per cent. In 1933-34 there was again a 10 per cent. difference in favour of new seed with the Cambridge selection, but no difference with the Northamptonshire beans. In all experiments, detailed studies were made during the growth of the crop, and these served to show that yield differences in favour of new seed arose chiefly as a result of more profuse branching in the early stages (March). The early produced branches bore pods at harvest, whereas those produced later were often podless.

An interesting observation was made in relation to the Northamptonshire beans in 1934. The new seed of that strain was derived in that year from self-sown plants growing in a wheat crop, and was 37 per cent. heavier per bean than the corresponding old seed, as compared with the normal 10-20 per cent. difference. That self-sown plants often give large beans is fairly well known, but the interesting point was that the plants produced by them gave large beans at the following harvest. The drill setting used did not fully allow for the discrepancy in size, and consequently the plots for Northamptonshire new seed carried a thinner "plant" throughout the year, and actually produced a con-

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siderably lower number of beans at harvest. Its beans were, however, individually 25 per cent. larger than the control, and this was sufficient to bring the total yield up to the level of the old seed.

In general practice seed rates of both two and three bushels per acre are common. The higher rate is often adopted to allow for depredations of birds, but it is well known that too thick a seeding may lead to poor podding, as many farmers have found during the present year. In the 1933-34 experiment the two seed rates were compared, and it must be clearly stated that rooks did considerable damage to the plots, and in those circumstances the higher rate more than justified itself. The 50 per cent. increase in the number of seeds sown with the three bushel rate led to a 40 per cent. increase in pod-bearing stems at harvest, and to a 20 per cent. increase in number of pods and in yield. This difference amply repaid the extra expense for seed.

The general conclusion to be drawn from this work is that whereas new and one-year-old beans can reasonably be used for seed the balance lies in favour of the new. The desirability of using new seed is accentuated by its lower financial value, though the choice will be influenced, also, by the actual condition of the seed and by the proportion of split beans included. As the difference in yield is only of the order of 10 per cent. it may be that after an unfavourable harvest, when new seed would be in poor condition, the use of one-year-old seed would be justified.

Examinations in Milk Processing and Control

THE City and Guilds of London Institute (Department of Technology) has inaugurated a scheme of examination in milk processing and control which will come into operation in the forthcoming 1935-36 Session. The syllabus for this scheme has been drawn up by the Institute's Advisory Committee on Milk Processing and Control, and copies may be obtained from the Superintendent, Department of Technology, City and Guilds of London Institute, 31, Brechin Place, South Kensington, S.W.1. The Advisory Committee includes representatives of Government Departments, public bodies and others interested in milk distribution.

It is hoped that the provision of this scheme of examinations (leading to the certification of successful candidates)

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will encourage the formation of classes of instruction in different parts of the country. Those who desire to avail themselves of the facilities offered under the scheme are advised to consult the local Directors of Education, or the Principals of local Technical Institutes, who will inform them of any local courses of instruction there may be that are suited to their needs. It is believed that the milk distributors' industry would benefit by the infiltration of persons trained and examined in accordance with the provisions of this scheme.

The Institute's examinations can be taken at any Technical Institute or other centre in Great Britain and Ireland at which the local Education Authority accepts responsibility for their conduct: they can also be taken at approved centres at many places overseas. No candidate, therefore, need go far from home to sit for these examinations, of which there are two—Intermediate Grade and Final Grade—those who have passed the former being eligible to sit for the latter. The first Intermediate Examination will be held on May 6 and 7, 1936. The entry fee of 5s., together with any charges made locally to cover expenses, is payable through the local Education Authority.

The History of English Agriculture*

THE widespread and growing recognition of the importance of farming in the national economy of peoples has awakened the interest of the major urban populations of the world in current agricultural problems. It has awakened interest, too, in earlier conditions out of which these modern problems have developed, because many of them have an intimate bearing upon some of the solutions offered at the present day. For those who wish to make themselves familiar with the story of farming in England and Wales, many modern treatises have been prepared and it is unnecessary for the seeker after knowledge to adopt the method of the historian in verifying results by recourse to original sources.

It is for those who wish to make an intelligent study of the development of our agriculture that Dr. Edwards has prepared his bibliography, which he does not pretend is

* Selected References on the History of English Agriculture. By Everett E. Edwards. United States Dept. of Agric. Library Bibliographical Contributions No. 24. July, 1935, pp. 42. Mimeographed.

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complete. His choice of works has been made with careful regard to the accessibility and utility of the books.

The first few pages are devoted to a description of fuller bibliographies. The remainder deal with the histories themselves; and it is not too much to say that no modern work of major importance has been omitted from this list. The contents of each work are fully detailed, so that those who wish to prime themselves on the different branches should have no difficulty in selecting the proper books for their purposes. The whole is completed by a comprehensive subject index.

Dr. Edwards, who is the editor of the Agricultural History Society's quarterly, *Agricultural History*, has performed a signal service to students of the subject by the compilation of this work, which should prove of great value in enabling University students and the intelligent general public to make immediate reference to the subjects engaging their attention.

Fruit: World Production and Trade

DURING a period of depressed trade, marked by a general shrinkage in the volume of shipments, it is somewhat encouraging to find that fruit is not only holding its own, but even forging ahead. This fact emerges from a report, entitled "Fruit," just issued by the Imperial Economic Committee and giving statistics of the production and trade in fruit of various kinds throughout the world. The report is the second of a series of short surveys that will ultimately cover the principal primary products.

Modern theories of nutrition attach great importance to the consumption of fruit, and the growth in supplies will no doubt be most welcome to those interested in the improvement of the general health of the community.

For various reasons, complete and reliable figures of production are difficult to secure. For several fruits the increase in production since the War cannot be precisely stated. The increase has been large, particularly in those countries where fruit is grown exclusively or mainly for export. The industry could not hope to escape altogether the effects of the world depression, but it does not appear to have suffered as severely as might have been expected. This is obvious from the more reliable export figures quoted in the report. These show the general trend to be upward, especially regarding citrus fruits, exports of which, in

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1933, were 30 per cent. higher than the average of the years 1927-31. Spain still provides more than half the citrus total and her annual exports have on occasion exceeded a million tons. Other producers of citrus fruits, however, are noticeably extending their shipments—in particular, Palestine, South Africa and Brazil. Exports from Brazil increased each year from 11,000 tons in 1927 to 84,000 tons in 1933. In the same period, exports from South Africa rose from 25,000 to 67,000 tons and, although the rise has not been so regular, exports from Palestine have increased from 92,000 to 147,000 tons. World trade in citrus fruits of all kinds increased from an average of about 1,300,000 tons in the period 1923-27 to over 2,000,000 tons in 1933.

The international trade in apples has also increased, but at a less rapid rate. Fruit exports from Empire countries have fully shared in the development of world exports. In 1933, exports of apples from Canada, Australia and New Zealand were double the 1927-31 average. Exports of pears from Australia, of citrus fruits from South Africa and Palestine, of grapes from South Africa, of raisins and currants from Australia and South Africa, and of canned fruits from Malaya, Canada, Australia and South Africa were, in each instance, substantially greater in 1933 than the average of the years 1927-31.

The Empire as a whole, however, still remains a net importer of all the important fruits with the exception, in normal years, of bananas. This is due to the heavy import of fruits into the United Kingdom and Canada. Nevertheless, dependence on foreign supplies is lessening. Thus net imports of apples in 1933 amounted only to 73,000 tons, compared with an average of 160,000 tons in the previous five years.

Among all importing countries, the United Kingdom is by far the most important, and, on an average, is the world's largest import market for apples, pears, oranges, lemons, raisins and currants, and canned fruits. Germany comes next in importance as an import market for these products, and is the world's largest importer of fresh grapes. Other European markets are also increasing in importance as outlets for surplus fruit supplies. The United States, in view of her own large production, is not an important importer of fresh fruit, except bananas, of which she takes by far the largest supplies in the world, averaging annually about three times those of the United Kingdom.

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A distinctive feature of the United Kingdom trade during recent years has been the growth of imports from the Empire countries. In the past five years, apple imports have averaged 300,000 tons, of which 60 per cent. came from the Empire, principally Canada, Australia and New Zealand. In 1934, the proportion was 77 per cent. Of pear imports, 36 per cent. were of Empire origin. The bulk of the orange imports, averaging 520,000 tons, still comes from foreign countries, but Empire supplies account for nearly 30 per cent. of the total and the proportion is increasing. More than half the banana imports of 325,000 tons come from the British West Indies. Empire countries, principally Australia and South Africa, send to the United Kingdom 30 per cent. of her average imports, amounting to 127,000 tons, of raisins and currants. In 1934, the proportion rose to 45 per cent. Annual imports of canned fruits have of late averaged 150,000 tons, of which 40 per cent. came from the Empire overseas. The Empire contribution, which in 1928 was only 28 per cent., had risen, in 1934, to 44 per cent.

International Horticultural Congress, Rome, 1935

THE XIth International Horticultural Congress will be held in Rome this month—September 16 to 21. Over 280 national reporters, nominated by the Ministries of Agriculture of the various countries of the world, will be attending, in addition to an even greater number of representatives of horticultural societies, etc. The Congress, which is under the patronage of the King of Italy, will be inaugurated at the Capitol, the subsequent sessions being held at the International Institute of Agriculture. In connexion with the Congress special tours to places of interest and beauty in Italy have been organized by the Compagnia Italiana Turismo. Full particulars of these are given in the Congress Programme, which is published in five different languages, and contains all information and directions regarding travel, fares, concessions on railways, sea and air lines, also a list of hotels and pensions and their tariffs. Readers wishing to attend the Congress should apply for a copy of the English edition of the Congress Programme to the General Secretariate, XIth International Horticultural Congress, at the International Federation of Technical Agriculturists, Rome, Via Regina Elena 86.

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Sampling Observations on Wheat, 1934-35

Report for Third Quarter.—The observations for this quarter cover the months April to June, and the events for which dates have been calculated are: (1) maximum shoot density, (2) maximum growth rate, (3) ear emergence. The state of the crop at each date is shown in the accompanying table.

It has been interesting to observe this quarter how the crop has steadily lost ground in rate of progress compared with the past two seasons. In 1932-33, it will be recalled, wheat showed an early development at all stages of its growth, whereas in 1933-34 the rate of progress was normal. This year development was exceptionally early in the first two quarters, tillering date being reached much earlier than in either of the previous two years. The dates of maximum shoot density, however, were later than in 1932-33 at three stations, and those of maximum growth rate at all stations. By ear emergence the dates had even fallen behind those of 1933-34, except at Sprowston and, for Yeoman, at Newport.

The dates of maximum shoot density ranged from March 20 for Yeoman at Seale-Hayne to May 1 for Squarehead's Master at Plumpton. Earlier maxima, not shown in the table, occurred at Woburn on March 17-18 and at Wye on March 25-26. Curiously enough, the same feature also occurred at Woburn in 1933-34 and at Wye in 1932-33. Squarehead's Master reached maximum shoot density earlier at 6 stations out of 9 and gave a smaller maximum shoot density at all stations except Boghall. The shoot densities were remarkably high at Rothamsted, the figure for Yeoman being 9,202 for 32 metres. Apart from this station, the range of maximum shoot densities, from 2,000 to 6,000, agrees closely with that in the two previous years.

Maximum growth rates were determined at six of the ten stations, the remaining four having to be omitted because of insufficient observations on shoot heights at the time of ear emergence. Several features noticed in the past two seasons have again appeared consistently. Amongst these may be mentioned: (1) the smallness of the variations from station to station in the dates, which range only from June 7 to June 18, (2) the smallness of the variation in shoot density compared with that at the date of maximum shoot density. Yeoman at Rothamsted and Squarehead's Master at Wye represent opposite ends of the range on both dates,

SAMPLING OBSERVATIONS ON WHEAT, 1934-35, THIRD QUARTER.

Station	Variety	Maximum Shoot Density			Maximum Growth Rate			Ear Emergence						
		Date	Shoot Density per 32m.	Shoot height cm.	Date	Rate cm. per day	Shoot Density per 32m.	Shoot height cm.	Date	S.E. of diff. of rate	Rate % per day	S.E. of diff. of rate	Shoot Density per 32m.	Shoot height cm.
LONG SUTTON Hampshire	S.H.M.*	Apr. 19.43	3003	3.78	—	—	—	—	June 25.75†	± 0.254†	12.2†	± 0.566†	1032†	—
	Yeoman	Apr. 20.09	4315	2.90	—	—	—	—	June 25.77†	—	13.1†	—	1337†	—
	Wilhelmina	Apr. 25.34	2239	4.18	—	—	—	—	June 26.02†	—	7.5†	—	912†	—
	S.H.M.	Mar. 23.15	3527	4.86	—	—	—	—	June 16.98	—	8.7	—	1839	—
SEALE-HAYNE Devonshire	Yeoman	Mar. 20.23	5055	2.66	—	—	—	—	June 17.24	± 0.577	8.7	± 0.942	2555	—
	Garton's No. 60	Mar. 23.14	2749	5.64	—	—	—	—	June 16.14	—	6.9	—	1843	—
WYVE \$ Kent	S.H.M.	Apr. 9.64	2118	—	June 12.34	3.17	1645	38.56	June 26.06	± 0.238	8.1	± 0.386	1444	64.33
	Yeoman	Apr. 17.04	2459	2.02	June 13.95	2.16	1859	35.68	June 26.55	—	10.6	—	1658	57.25
	S.H.M.	Apr. 10.31	7063	3.12	June 7.57	2.47	2607	58.79	June 25.46	—	13.2	—	2551	95.19
	Yeoman	Apr. 6.30	9202	2.10	June 9.20	2.18	3174	48.52	June 25.86	± 0.126	16.9	± 0.801	3107	79.47
PLUMPTON	Victor	Apr. 10.70	6343	2.79	June 12.28	2.25	2741	62.05	June 25.86	—	15.9	—	2732	90.61
	S.H.M.	May 1.94	3427	—	June 9.81	3.00	2328	51.35	June 26.82	± 0.423	12.2	± 1.081	1879	89.49
CIRENCESTER Gloucestershire	Yeoman	Apr. 29.08	4785	—	June 11.66	2.63	2727	44.57	June 27.92	—	12.4	—	2278	77.60
	S.H.M.	Apr. 20.03	4256	6.75	—	—	—	—	Before June 24	—	—	—	—	—
	Yeoman	Apr. 21.33	5683	5.36	—	—	—	—	June 24	—	—	—	—	—
	S.H.M.	—	—	—	June 7.51	2.54	1614	58.94	June 22.46	—	26.3	—	1670	89.91
NEWPORT Shropshire	Yeoman	—	—	—	June 7.58	2.27	2061	47.59	June 22.80	—	27.3	—	1989	75.26
	S.H.M.	—	—	—	—	—	—	—	June 23	—	—	—	—	—
WOBURN Bedfordshire	Yeoman	Apr. 25.52	3678	7.80	—	—	—	—	June 24	—	—	—	—	—
	Yeoman	Apr. 28.24	4451	5.91	—	—	—	—	June 24	—	—	—	—	—
SPROWSTON Norfolk	Victor	Apr. 26.51	3876	7.20	—	—	—	—	June 24	—	—	—	—	—
	S.H.M.	Mar. 30.20	4430	2.28	June 9.26	2.01	1852	43.74	June 25.86	—	15.0	—	1670	67.87
BOGHALL Edinburgh	Yeoman	Apr. 3.54	5539	1.83	June 12.93	1.57	2060	35.59	June 24.73	± 0.115	15.0	± 0.467	2081	52.45
	S.H.M.	Apr. 11.27	6008	1.55	June 17.21	2.03	2291	46.75	July 5.04	± 0.130	14.5	± 0.373	2041	75.23
	Yeoman	Apr. 15.49	5926	1.04	June 18.28	1.84	2313	39.06	July 5.92	—	14.5	—	2074	64.62

* Squarehead's Master.

† Based on 6 instead of 8 blocks.

‡ Applicable to Squarehead's Master and Yeoman only.

\$ Based on 32 three-quarter metre samples.

|| Computed from two dates only.

¶ Observer's estimates

Certain values (indicated by blanks in the Table) could not be determined because the observations at the stations in question were incomplete.

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and the intervening period is almost the same for both. The former fell from 9,202 to 3,174 per 32 metres and the latter from 2,118 to 1,645. (3) Squarehead's Master was taller, appeared slightly earlier and had a higher rate at all six stations. The rates and shoot heights were on the average about the same as in 1933-34. The highest rate this season was 3.17 cm. per day for Squarehead's Master at Wye.

The dates of ear emergence varied from June 16 at Seale-Hayne to July 5 at Boghall and were usually later than last year by 2 or 3 days. Squarehead's Master emerged earlier than Yeoman at all stations at which the date was observed, but the differences were very small, the greatest being just over a day. The rates of emergence were generally smaller than in the two previous years. The differences in rate of the two standard varieties were negligible except at Wye and Rothamsted, at which Yeoman had the higher rate. Shoot heights were on the average about the same as last year, the average for Squarehead's Master being 12.6 cm. higher than that for Yeoman.

Preliminary Report on Harvest Yields.—The harvest yields from 8 of the 10 centres which take the Wheat Sampling Observations are shown in the accompanying table. The results from Boghall are not yet available; at Cirencester the wheat was cut before samples could be taken.

The yields of grain were higher this year than last at Woburn, Plumpton and for Yeoman at Rothamsted. The yields of straw were higher at four stations, grain-straw ratios being smaller at all seven comparable stations. Comparable figures are available at six stations for the past three years, and the mean yield of these, given below for the standard varieties, shows how this season compares with 1934 and 1933.

		Mean yields: cwt. per acre					
		Grain			Straw		
		1933	1934	1935	1933	1934	1935
Squarehead's Master	..	21.4	34.2	26.4	43.8	52.6	55.1
Yeoman	.. ..	25.2	34.2	28.8	44.0	50.6	52.2

It will be seen that the grain yields lie intermediate between those of 1934 and 1933; the straw yields, on the other hand, are slightly above those of last year.

The local variety has again done well compared with the two standard varieties at the four stations shown below at which it was grown. The relatively poor crop at Wye was due to the disease known as Take-all.

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SAMPLING OBSERVATIONS ON WHEAT: YIELDS, 1935

Station	Variety	Yields, cwt. per acre			
		Grain		Straw	
		1934	1935	1934	1935
LONG SUTTON Hampshire	S.H.M. ...	*	10·9	*	18·1
	Yeoman ...	*	10·6	*	16·4
	Wilhelmina ...	*	10·4	*	14·3
SEALE-HAYNE Devonshire	S.H.M. ...	33·0	26·8	48·3	48·8
	Yeoman ...	31·8	25·5	40·5	50·1
	Victor ...	43·6	29·9†	53·6	52·1†
WYE Kent	S.H.M. ...	47·6	10·1	83·6	44·2
	Yeoman ...	52·0	20·2	84·4	41·6
ROTHAMSTED Hertfordshire	S.H.M. ...	32·3	30·6	45·0	79·9
	Yeoman ...	32·0	38·8	46·4	77·8
	Victor ...	32·0	37·3	41·1	84·4
PLUMPTON Sussex	S.H.M. ...	37·6	46·3	43·5	66·3
	Yeoman ...	32·7	48·1	35·8	79·6
CIRENCESTER Gloucestershire	S.H.M. ...	28·1	—	59·2	—
	Yeoman ...	37·2	—	61·6	—
NEWPORT Shropshire	S.H.M. ...	41·4	40·6	63·9	63·5
	Yeoman ...	45·9	39·4	68·1	61·7
WOBURN Bedfordshire	S.H.M. ...	20·5	28·4	37·5	64·1
	Yeoman ...	17·2	30·0	28·8	56·2
	Victor ...	23·5	35·8	42·0	65·7
SPROWSTON Norfolk	S.H.M. ...	30·5	21·9	37·3	30·3
	Yeoman ...	26·0	19·2	35·2	26·1
	Wilhelmina ...	31·2	—	38·2	—
BOGHALL Edinburgh	S.H.M. ...	35·7	—	56·6	—
	Yeoman ...	35·7	—	61·9	—

*Crop failed.

†Garton's No. 60.

Sixth World's Poultry Congress, Berlin, 1936

THE date of the Sixth World's Poultry Congress, at Berlin next year, has been changed, and it will now be held from July 24 to August 2. Originally, it was intended that the Congress should synchronize with the Olympic Games, which begin on August 1, but, in view of the large number of people now known to be coming to Berlin for the latter

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fixture, it was considered desirable to make the Congress date a week earlier to ensure that there would be adequate accommodation for those attending it. Members of the Congress taking the subsequent tour through Germany, from August 3 to August 10, will, however, be able to attend the official opening of the Olympic Games; also to witness the closing events if they wish to do so.

United Dairies' Scholarships, 1935-36

THE United Dairies' Scholarships awarded for the year 1935-36, the colleges at which they are tenable, and the names of the successful candidates (with the schools at which they were educated) have been announced as follows:—

TENABLE AT READING UNIVERSITY:

3-YEAR DEGREE COURSE—

Ruth A. White, Milton Abbas, Blandford, Dorset (Dorchester Girls' County School).

Elizabeth G. Small, Dunwear, Bridgwater, Somerset (Bridgwater County School for Girls).

2-YEAR DAIRYING DIPLOMA COURSE—

Norman C. Scriven, Wadeford, Chard, Somerset (Ilminster Grammar School).

TENABLE AT SOMERSET FARM INSTITUTE, CANNINGTON:

1-YEAR DAIRYING COURSE—

Mary F. E. Loxton, Yatton, near Bristol (Colston's Girls' School).

Francis J. Marshall, Barrow Gurney, near Bristol (Wellington School, Somerset).

William J. Dredge, Halstock, Dorset (Beaminster Grammar School).

These scholarships, which are awarded annually, are provided from the Fund created, in 1924, by United Dairies, Ltd., for the purpose of promoting and encouraging practical and scientific education in dairying and dairy farming. They are available for the sons and daughters of farmers and smallholders in the counties of Cornwall, Devon, Dorset and Somerset, and are tenable at various agricultural centres of education.

SUGAR POLICY: PROPOSALS OF HIS MAJESTY'S GOVERNMENT*

THE Government have given careful consideration to the Reports† of the Committee presided over by Mr. Wilfrid Greene, K.C. These Reports on a subject of great difficulty and complexity have been of the greatest assistance to them in the determination of their sugar policy.

The conclusions which the Government have reached and the financial and administrative arrangements which are necessary to give effect to them are set out below. Legislation embodying these proposals will be introduced as soon as possible in the next Session of Parliament.

I.—The Beet Sugar Industry.—*Continuation of Assistance.*—1. The Government have reached the conclusion that it is desirable, on agricultural grounds, to continue to assist the beet sugar industry without any specific limitation of the period during which assistance may be given.

Limitation of Assisted Production.—2. They consider it necessary, however, to set a limit to the volume of assisted production.

3. The limit of directly assisted production will be the equivalent of 560,000 tons of white sugar.‡ It is not desired to encourage production in excess of this amount, and any excess will be eligible for duty preference only.

Appointment of Sugar Commission.—4. As recommended by the Greene Committee, the Government propose to appoint an independent Sugar Commission to be entrusted with such powers in relation to the sugar-beet industry as may be necessary for the carrying out of the Government's policy.

Amalgamation of Beet Sugar Factory Companies.—5. It has been decided to adopt the recommendation of the Greene Committee that the existing beet sugar factory companies should be amalgamated in a single Corporation, under the supervision of the Sugar Commission.

* Cmd. 4964. Obtainable from H.M. Stationery Office at the addresses given on the cover of this JOURNAL. Price 2d., post free 2½d.

† Cmd. 4871.

‡ The output of home-grown sugar in the season 1934-35 was the equivalent of 602,000 tons of white sugar. In the coming season, the output, in terms of white sugar, is estimated to be 560,000 tons, being the produce of 375,000 acres of sugar beet to which growers' contracts were restricted by direction of the Government.

SUGAR POLICY: PROPOSALS OF H.M. GOVERNMENT

6. This decision has been reached, partly on agricultural, partly on financial grounds. The primary object of maintaining the industry being to assist agriculture, the Government could not regard any plan as satisfactory which did not provide a reasonable degree of assurance that growers would continue to be given the opportunity to contract for an adequate supply of beet within the financial limits laid down. But experience has shown that the costs of the several factories vary widely, owing, among other reasons, to their situation having been chosen with the special object of enabling the benefits of State assistance to be spread over as wide an agricultural area as possible. If therefore the factories were to be left independent, the rate of assistance must either be such as would keep all the factories in existence, in which case it would be unfair to the Exchequer and unjustifiably generous to the lower-cost units, or, if it is to be fair to the Exchequer, it must be on such a scale as would make it impossible for the higher-cost factories—not merely one or two exceptional units, but a large proportion of the whole—to carry on, thus defeating the purpose for which the industry is primarily maintained.

7. The Beet Sugar Factories Committee, representing all the beet sugar companies, have informed the Government that they are prepared to recommend in principle to the Boards of the respective Companies that an amalgamation scheme should be prepared and submitted as soon as possible to the Sugar Commission and, if approved by them, to the Government.

8. The Factories Committee are unanimously of the opinion that if the Amalgamated Corporation is to be formed, it is desirable that it should become operative before the 1st April, 1936, in order that the Corporation and not the individual factories may make the contracts with growers in respect of next year's crop. The Government share this view, and in order to facilitate procedure, they propose to set up an informal tribunal to examine and advise them upon any scheme of amalgamation which the factories may submit for the Government's approval.

Financial Arrangements.—9. The financial arrangements which the Government propose to submit to Parliament proceed upon the following assumptions:—

(i) that, as from the 1st April, 1936, there shall be a transitional period, of not less than two and not more than five years, to give time to the Amalgamated Corpora-

SUGAR POLICY: PROPOSALS OF H.M. GOVERNMENT

tion to reduce the average level of costs to the lowest level which can be expected, assuming (a) a uniformly high standard of managerial and technical efficiency throughout all the factories, and (b) that effect has been given to the maximum possible economies consequential upon amalgamation;

(ii) that the rate of assistance to be given when this assumed low level of costs (hereafter called the "basic rate") has been reached, cannot be determined until towards the end of the transitional period, since it must take account of current conditions;

(iii) that, during the transitional period, transitional rates of assistance shall be given, upon a diminishing scale, the rate for 1936 being determined by the Government upon the evidence now before them, and the rate for each subsequent year being determined by the Government after receiving a report from the Sugar Commission;

(iv) that, if at any time during the transitional period the Amalgamated Corporation are able to satisfy the Sugar Commission that, for reasons not within their control, the transitional period as then fixed has not been long enough to enable the factories' costs to be brought down to the basic rate, the Sugar Commission may, if they think fit, advise the Government that the transitional period shall be extended, so, however, that the rate of assistance during such extension shall be on a diminishing scale;

(v) that the rate of assistance throughout the transitional period shall assume the following standard conditions, namely:—

For sugar-beet	A price of 35s. per ton of beet of 15½ per cent. sugar-content.*
For raw sugar, 96° polarization, pre-duty.	A price of 4s. 6d. per cwt.
For the refining margin	13s. per cwt.
For duty preference	4s. 9d. per cwt. of white sugar.

and that any variation from these standard levels, other than casual variation within limits to be defined, shall be off-set by corresponding adjustments of the current rate of assistance;

(vi) that the risk of serious reduction of throughput and consequent increase of costs due to crop failure or other natural causes shall not fall wholly upon the Corporation.

* Plus or minus 3d. for each 0.1 per cent. above or below 15½ per cent.

SUGAR POLICY: PROPOSALS OF H.M. GOVERNMENT

10. It is proposed that, at the end of the transitional period, assistance shall continue to be given at a basic rate which shall be subject to review at triennial intervals, under conditions which, while safeguarding the interests of the Exchequer, shall give to the Amalgamated Corporation reasonable incentive to maintain and increase its efficiency.

11. In fixing the rate of assistance in each year, it will be the intention to provide the Amalgamated Corporation with an income which, subject to the assumptions indicated in paragraph 9 (i) above, shall be sufficient to provide for normal amortisation of plant and factories and a reasonable return on its approved capital.

12. State assistance in respect of sugar produced from the 1936 and subsequent crops will be given to the Amalgamated Corporation only.

Limitation of Acreage.—13. The acreage to be contracted for in any year will be subject to a maximum limit to be approved by the Sugar Commission.

Rate of Assistance for 1936.—14. The Government propose that the inclusive rate of assistance for 1936, calculated upon the above standard conditions, shall be 5s. 1½d. per cwt. As explained below, this must be adjusted to 5s. 3d. in order to allow for the proposed variation from standard in the price of beet for 1936.

Beet Price.—15. The price* to be paid to the growers for sugar-beet sown in 1936 is to be 35s.† and 36s.† per ton respectively for beet delivered to factories that have contracted to pay the current rates of 36s. and 38s. per ton respectively. In the case of beet grown for the Cupar factory, the contract price for beet sown in 1936 will be 34s. per ton, which will be payable free-on-rail as at present. These prices assume a factory output of not more than the equivalent of 560,000 tons of white sugar.

16. The price to be paid for beet in 1937 and subsequent years and the terms and conditions of the beet contract will be matters for negotiation between the Amalgamated Corporation and the growers in the light of the rate of assistance for the year announced by the Government. If the two sides fail to agree on any point, the matter will be referable

* Basis 15½ per cent. sugar-content.

† The average rate for 1936 will therefore exceed the standard level of 35s. od. (see paragraph 9 (v)) by approximately 4½d. per ton of beet, equivalent to 1½d. per cwt. of sugar; and the rate of assistance for 1936 must be adjusted accordingly.

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by either side to the Sugar Commission, which should have power to make a final and binding determination.

Sugar-Beet Marketing Organization.—17. Just as, on the one hand, the Sugar Commission will be in contact with an Amalgamated Corporation of beet sugar manufacturers, so, on the other hand, it would be an advantage if the Commission had to deal with a body representative of all the growers of sugar-beet and able to act with authority on their behalf. The Greene Committee noted certain functions which might usefully be discharged by a Sugar-Beet Marketing Board. It is clear that such a Board would form a convenient part of the general plan of organization of the industry as a whole. A draft scheme for the constitution of a Sugar-Beet Marketing Board is at present before the Ministers concerned, having already been the subject of a public inquiry. It will be for the promoters of the scheme to re-examine it in the light of the new conditions and to decide whether they wish the scheme to proceed, subject to such modifications as the Ministers concerned may propose.

II.—Relations between the Beet Sugar Factories and the Refineries : *Production of White Sugar by Factories.*

—18. In paragraphs 263 to 265 of their Report, the Greene Committee made certain recommendations for the regulation of refined sugar production as between the beet sugar factories and the refineries, the effect of which would be to offer a direct inducement to the factories to produce 600,000 tons of white sugar (including off-season refining) instead of about 380,000 tons as in 1934. Most of this tonnage would be produced in the course of the beet-sugar manufacturing campaign, which normally extends over a period of not more than 16 weeks. The total United Kingdom consumption of white sugar is about 1,900,000 tons per annum; and the Government, after consultation with all the interests concerned, have reached the conclusion that the economic disturbance caused by so sudden and violent a change in the present distribution of white sugar production in the United Kingdom is such that it would be undesirable to adopt the Greene Committee's proposals in their present form.

Proposed New Industrial Agreement.—19. In considering possible alternative arrangements, the Government have aimed particularly at the attainment of the following objectives:—first, that the financial effects, as regards all the

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interests concerned, shall be as nearly as possible those which it is reasonable to expect would have followed from the adoption of the Greene Committee's own proposals; secondly, that the Amalgamated Corporation shall have the same opportunity and the same inducement to produce white sugar as the individual factories have under existing conditions, including the present Agreement between themselves and the refiners; and thirdly, that any arrangements which it may be decided to make shall be embodied in a new Agreement between the factories and the refiners which both sides are prepared to operate in a spirit of good will.

20. The Government are satisfied that these objectives have been attained in the following arrangements which it is proposed, with the agreement of both the refiners and the factories, shall take effect as from the 1st April, 1936, and shall be embodied in a new Agreement to run for five years from that date.

21. For the purpose of enabling the Government to frame their immediate sugar policy, no change shall be made in the existing Customs, Excise and subsidy scales. The factories shall be allowed quota rights for the production of white sugar up to a total of 720,000 tons per annum, but during the currency of the new Agreement their actual production shall not exceed that allowed under the existing Agreement, i.e., 500,000 tons. In return, the refiners agree to purchase all quota rights offered to them at a "quota value" of 1s. 4½d. per cwt., with provision for abatement of the quota value in the event of the refining margin (that is, the source from which the quota value would be paid) being reduced below the present level of 13s. per cwt. In that event, a corresponding adjustment shall be made in the rate of assistance to the beet sugar industry. The Government, for their part, undertake to seek statutory powers to provide for spreading the liability for the payment of quota value over the whole body of refiners operating at any time, in proportions to be approved by the Sugar Commission; they also propose that, before the proposed new Agreement expires, the Sugar Commission should inquire further into the question of the existing fiscal discrimination in favour of raw sugar production by the factories and, after consulting both the refiners and the Amalgamated Corporation, should advise them whether it would be in the public interest that, after the 31st March, 1941, this discrimination should be removed, if necessary by such stages as may prevent

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undue disturbance of the white sugar market and dislocation of refining operations.

Control of Refining Margin.—22. In paragraph 268 of their Report the Greene Committee propose that the Sugar Commission should be given the power to prescribe either a maximum or a minimum (or both) for the refining margin. After very careful consideration the Government have decided not to adopt this proposal. On general grounds they would wish to avoid any arrangement which would entrust the power to control sugar prices to a body appointed by the Government. They have received from the refiners an assurance in a satisfactory form that it is not their intention to raise the refining margin above the parity of the present level.

Possibility of Licensing System.—23. The Government have taken note of the view expressed by the Greene Committee (paragraph 267) that it may become necessary to make provision for the licensing of the production of refined sugar, the requisite powers, analogous to those of a Development Board under the Agricultural Marketing Acts, being entrusted to the proposed Sugar Commission. It would certainly not be the desire of the Government to impose a licensing system on an unwilling industry, nor would they introduce such a system unless they were satisfied that the consumers' interests could be properly protected. They are of opinion, however, that it would be expedient to provide for the possibility of a licensing system in the legislation that it will be necessary for them to submit to Parliament to give effect to their general proposals. Accordingly they propose to seek power to introduce such a system, subject to the specific approval of Parliament, if it should be represented to the Government by the Sugar Commission that licensing is desirable in the general interest, with due regard to the interests of the consumer, in order to promote the efficiency of the refining industry and in particular to facilitate the operation of a scheme, approved by the Sugar Commission, for the maintenance of an economic throughput in the refineries by the elimination of redundant and inefficient capacity and the prevention or reduction of excessive production.

III.—Research and Education.—24. The Government share the view of the Greene Committee that it is of the first importance that any scheme for the permanent

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organization of the beet sugar industry should provide for a programme of research and education on a larger scale than in the past. They consider, however, that, as hitherto, the cost should fall mainly upon the industry. They contemplate that a share should be contributed by the Amalgamated Corporation out of the margin allowed for profit in the basic rate of assistance and that a contribution should be made by the growers and by the refiners in so far as the programme is applicable to their industry. The Sugar Commission would seem to be the appropriate body to co-ordinate contributions and programmes.

IV.—The International Situation.—25. The Chadbourne Scheme of 1931, which was an attempt on the part of the principal sugar exporting countries to improve market conditions by regulation of exports, has failed in its main object and is due to expire on the 1st September, 1935. Attempts have been made to renew it on a firmer basis, but the negotiations are believed to have reached a deadlock. It has therefore been necessary for the Government to consider very carefully the international situation as a part of the general review of sugar policy upon which they have recently been engaged.

26. With the world price of sugar at its present level, round about 4s. 6d. per cwt., it is safe to assume that no country in the world can produce sugar at a profit. The Government believe that the sugar producing countries can only hope to set the industry upon an economic basis by means of an international agreement for the adjustment of supplies to the requirements of the world market, accompanied by the acceptance of the principle that State assistance, in whatever form, should everywhere be diminished as market conditions improve. Their own domestic policy, as indicated in the first part of this Memorandum, is in full accordance with this view. They now propose to invite the Governments of the sugar-exporting Dominions and Colonies to examine with them the possibility of a joint endeavour to reopen international negotiations if it should appear that there is a reasonable prospect of a successful issue thereto.

V.—Estimated Future Cost of Assistance to the Beet Sugar Industry.—27. Since under the Government's proposals the rate of assistance will in future vary according to a number of factors, it is impossible to give a firm esti-

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mate of the total cost of State assistance. If, however, it were to be assumed that there will be no change in 1936 in the standard conditions mentioned in paragraph 9 (v) of this Memorandum, other than the modification of the beet price described in paragraph 15, the maximum amount of subsidy payable in respect of sugar produced from the 1936 crop would be as follows, the figures for 1934 and 1935 being given for comparison:—

	£
1934 at 7s. 3d. per cwt. (including molasses) ..	4,450,000
* 1935 at 6s. 6d. per cwt.	3,640,000
1936 at 5s. 3d. per cwt. on the equivalent of 560,000 tons of white sugar	2,940,000

28. The value of the duty preference varies according to the proportion between white and raw produced at the factories, the loss of revenue declining in proportion as the ratio of white to raw sugar rises. In 1934, the value (on an output equivalent to 602,000 tons of white sugar) was £3,170,000; in 1935 it is estimated at £2,900,000; and in 1936 the amount will be the same, unless the proportion should change.

29. The amount of duty paid or estimated to be payable to the Revenue in respect of sugar produced from beet grown during the same period is: 1934, £2,500,000; 1935, £2,300,000; 1936, £2,300,000.

30. The cost of assistance during the rest of the transitional period cannot yet be foreseen, but the Government's proposals provide for the diminution of the rate of assistance (as calculated upon the standard conditions) year by year.

30th July, 1935.

* The British Sugar (Subsidy) Bill, 1935, now before Parliament, provides for the payment of subsidy at the rate of 5s. per cwt. only, in respect of sugar produced in the year 1935-36. It was explained in the Memorandum on the Financial Resolution (Cmd. 4922) that this figure is based on the ascertained average costs of operation of the factories without allowance for capital services; and that the question what further allowance, if any, should be made in respect of such services for the year 1935-36, was reserved for further consideration after the Greene Committee's Report had been examined. The Greene Committee recommended allowances for these services at the rate of 1s. 6d. per cwt. inclusive for 1935-36; and the estimate of 1935 given in the text is based on these recommendations; the Government are not, however, necessarily committed to these figures.

HOUSING THE RURAL WORKER : PROGRESS OF RECONDITIONING IN DEVON

R. T. SHEARS, F.L.G.A.,
Housing Officer, Devon County Council.

The Housing (Rural Workers) Act, 1926.—Towards the end of 1926 a very useful measure entitled “ The Housing (Rural Workers) Act ” was placed on the Statute Book.

The Act sought to secure within a limited period of five years a substantial improvement in the amenities of country cottages occupied by agricultural workers and persons of similar economic standing, by means of grants from county councils, or, where those bodies did not desire to operate the Act, from rural district councils.

Up and down the countryside large numbers of cottages had for many years fallen into disrepair, mainly because of the heavy cost of upkeep and the low return received by way of rent. To the agricultural owner the spending of large sums of money upon dilapidated cottages was not an economic proposition, but with the passing of the Rural Workers Act there came a timely opportunity to such owners to “ set their houses in order.”

Under previous Housing Acts local authorities were compelled to say to the owner “ Recondition your cottage or we shall be obliged to make a closing order.” If the owner did not comply and the order was made the cottage went to the ground. The Act of 1926, however, enabled the local authorities to say “ Recondition these cottages according to our reasonable requirements and we will give you substantial help.”

Although good work was done in certain areas, progress generally was slow during the early years of the operation of the Act, and in 1931, when the Act was due to expire, Parliament extended its operation for a further five years.

In an address to the County Councils' Association in March of this year, the Minister of Health expressed considerable disappointment with the results that had been obtained. He did not include the active authorities with the inactive, but whilst some counties had done fine work in

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administering the Act, he feared they were rather the exception.

Figures recently published show that there has been considerable activity in the counties of Cumberland, Devon, Essex, Hampshire, East Suffolk and Worcestershire; and also in the counties of Cornwall, certain parts of Norfolk, and Shropshire, where the Act is operated by the rural district councils.

Progress of Devon Scheme.—In Devonshire, where the Act is operated by the county council, 1,200 dwellings have been reconditioned. Work is in progress on a further 150, whilst provisional approval has been given in regard to 60 others. These numbers are perhaps considerably higher than those of other counties, but this does not mean that the standard required in Devon is lower than that required elsewhere.

Every application is carefully considered by a special sub-committee, with the Rt. Hon. Sir Francis D. Acland, M.P., as Chairman. The sub-committee from the commencement have taken the view that where a grant of public money is involved the standard of amenity should be higher than that which would be necessary to comply with the statutory definition of a house “in all respects fit for human habitation.” If it were otherwise the Act would merely provide a convenient loophole for those who have evaded their obligations.

As a condition of the approval of schemes, therefore, the council make certain requirements that are common to all cases. As a matter of interest these are set out on pp. 549, 550. Where special circumstances make it necessary for relaxation in some particulars, the Committee are always ready to consider any representations made by the owner.

Extent and Conditions of Grant.—The maximum grant payable is £100 per dwelling on a total expenditure of £150 or over, and two-thirds of the cost where the total expenditure is below £150.

No grant is payable where the estimated cost is less than £50, or where in the opinion of the local authority the value of the dwelling after completion of the works will exceed £400.

The following conditions apply for a period of twenty years after payment of grant:—

- (a) The dwelling must be occupied by a person (whether as owner or tenant) whose income is such that he would not ordinarily

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pay a rent in excess of that paid by agricultural workers in the district.

- (b) The rent must not be more than the ordinary agricultural rent or the average rent paid during the previous five years, plus 3 per cent. on that part of the cost of the works not covered by grant.

If these conditions are not complied with, the grant must be repaid at compound interest.

The acceptance of a grant does not preclude the sale of the premises during the twenty-year period mentioned above, but the conditions, being attached to the dwelling itself, remain applicable whether or not the ownership of the dwelling changes in the meantime.

Cost of Devon Scheme.—The original scheme of the Devon County Council provided for the reconditioning of 200 dwellings, but with the consent of the Minister of Health this number has been increased from time to time to the present figure of 1,500. It has been found in practice that the average cost of reconditioning is in the region of £200 per cottage, and the maximum grant of £100 has been earned in more than ninety per cent. of the completed schemes.

The Council have approved estimates amounting to £150,000 to cover the expenditure on grants, the annual cost to the rates in loan charges on this amount being £5,466 for a period of twenty years. A similar charge is borne by the Ministry of Health.

The product of 1d. rate for general county purposes is £12,158, so that a rate of a halfpenny in the £ more than covers the annual expenditure.

Against this, however, must be set off the increase in rateable value (also, of course, in Schedule A value) which has arisen by the works of reconstruction. A considerable number of conversions have been made from premises previously of no rateable value, and many houses that might at any moment have gone out of occupation have been restored and become rate-producing hereditaments.

It must be apparent also that the spending of some £300,000 or so in the county on reconditioning must necessarily have done a great deal to relieve unemployment in rural areas.

The effect of better housing conditions and the vastly improved amenities that result from the operation of the Council's Scheme are already apparent, and the returns received from time to time from local sanitary authorities

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show that the Act is materially assisting to solve the problem of housing in remote rural areas of the county.

Compliance with Conditions.—The Devon scheme requires that the maintenance of the conditions under which grants are given shall be secured by periodical inquiry or inspections by or on behalf of the county council, and a signed statement is obtained in April of each year from the recipient of the grant certifying that those conditions have been observed during the year immediately preceding.

Surprise inspections undertaken from time to time have shown that the conditions, which relate mainly to the rent and occupancy of the dwellings, are generally observed, and that breaches of the conditions are comparatively few in number. In the latter event, prompt action is taken to secure that rents overpaid are refunded to the tenants or the grants are repaid with interest. In this connexion, the Council have recovered sums amounting to £2,166 from owners of 22 dwellings.

Illustrations of Reconditioned Dwellings.—Fig. 1 shows a group of cottages in a moorland village reconditioned in their original style. The owner has re-thatched the roofs to harmonize nicely with surrounding properties.

The dwelling shown in Fig. 2, erected in the early part of the eighteenth century and used as two dwellings, was allowed to become derelict. It was reconditioned under the Housing (Rural Workers) Act to provide accommodation for a rural worker and his family, and the work was carried out so satisfactorily that the owner is confident that the dwelling is good for another two hundred years' service. In this instance, also, the owner has retained the architectural features of the original premises.

Fig. 3 illustrates premises that served the combined purpose of a dwelling and an agricultural store. It has been enlarged and reconditioned under the Act as shown in Fig. 4, to make a satisfactory dwelling and at the same time provide ample accommodation for agricultural produce.

Figs. 5 and 6 show a block of cottages that, but for the Act, would have fallen into disuse and become an eyesore in a pretty village. There being no other accommodation available the occupants must necessarily have migrated to the already overcrowded areas of one or other of the nearest towns. The completed work shows three healthy dwellings capable of accommodating twenty persons without overcrowding. Figs. 7 and 8 are views of the same property from another angle.

Conversions.—Grants up to £100 per dwelling are also available, subject to the same conditions, for the conversion into dwellings of buildings not previously used for the purpose. A number of barns, stables and stores (and in one instance a disused school) have been converted into

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cottages, providing much-needed accommodation for agricultural workers in isolated country districts.

Figs. 9 and 10 show a stone and thatch barn on a large farm converted into three cottages. Figs. 11 and 12 show another interesting conversion.

Loans.—Under the Council's Scheme an owner of a cottage not already mortgaged, who is unable to meet his share of the cost of reconditioning, may borrow the balance from the county council at a very reasonable rate of interest, the present rate being $3\frac{1}{2}$ per cent. The mortgage deed is prepared free of cost by the county council, and the loan is repayable by half-yearly instalments over a period of twenty years.

Thus an owner, who is faced with an expenditure of say £200 on reconditioning a cottage, can meet the expenditure in the following way:—

Cost of Work (including Architect's fees)	£200
Grant	£100
On loan (at $3\frac{1}{2}$ per cent.)	£100
Repayments of Principal and Interest combined (half-yearly instalments)	£7 per annum
Increase of rent permitted	£3 ..

It will be seen from the above that it is possible for an owner completely to modernise a rural worker's dwelling at a net cost of £4 per annum.

A number of agricultural workers occupying their own cottages have taken advantage of this scheme, the total amount of loans so advanced or promised being £3,100.

Cottages of Architectural Interest.—The Committee require proper plans with accurate elevations of the buildings to be submitted on every occasion. Care is taken to make requirements that will preserve any architectural or artistic interest attached to the dwellings, and to secure, as far as possible, that the special character of the dwellings and their fitness for their surroundings is maintained.

It is not always possible to persuade applicants to re-roof their cottages with thatch. This method, though more pleasing in appearance, is objected to by many cottage owners on account of the necessity for frequent renewal, the tendency of thatch to harbour birds and vermin, and the risk of fire.

Figs. 13 and 14 show cottages reconditioned under the Act where thatch has been retained or renewed with satisfactory results. It should be mentioned in favour of thatch



FIG. 1 Cottages in a Devonshire moorland village reconditioned in their original style



FIG. 2 Rural worker's dwelling converted from the ruins of two derelict cottages. The owner has successfully retained the architectural features of the original building

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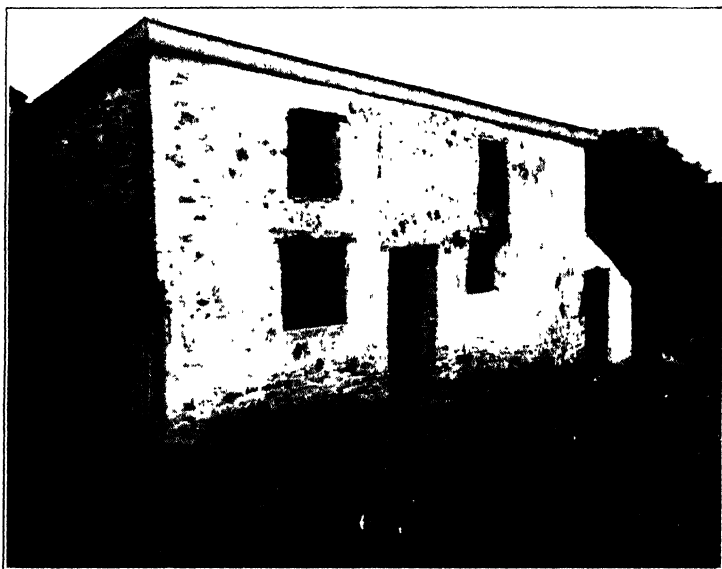


FIG. 3. These premises were used both as a dwelling and for a store for agricultural produce.



FIG. 4. With assistance, under the Rural Workers (Housing) Act, the premises shown in Fig. 3 have been transformed into a satisfactory dwelling, with storage accommodation on the ground floor (extreme right).

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FIG. 5 A block of three rural workers' cottages before re-conditioning



FIG. 6 The cottages shown in Fig. 5 after re-conditioning



FIG. 5. Rear view of the cottages shown in Fig. 5 before re-conditioning

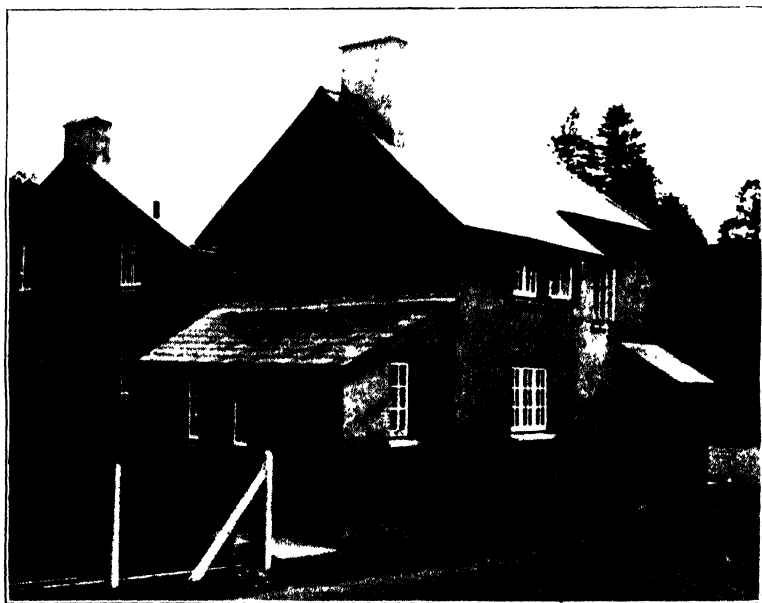
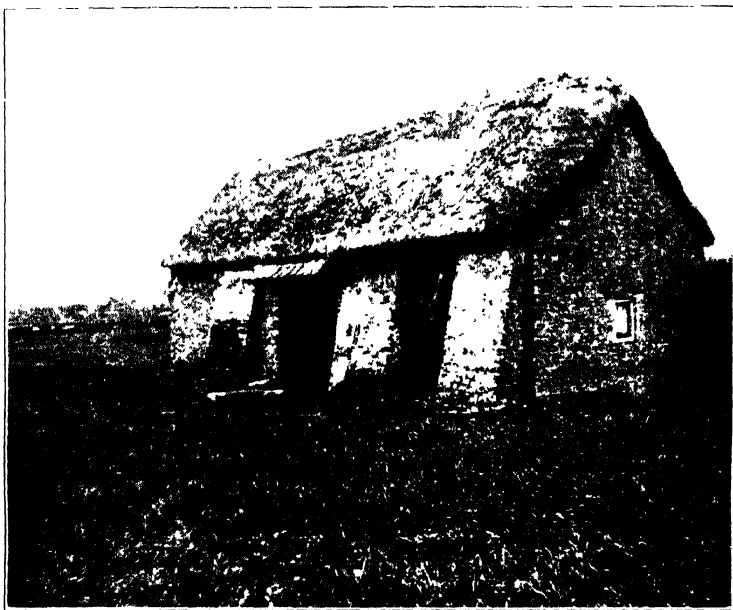


FIG. 6. The cottages shown above after re-conditioning. This scheme secured the maximum grant of £100 per dwelling



FIGS. 9 and 10. A disused stone-built barn (above) converted into three spacious cottages (below). Each cottage has three bedrooms, front room, living room or kitchen, scullery and larder. Water is piped to the sculleries.



Figs. 11 and 12 Stone and slated bath converted into four cottages for agricultural workers



FIG. 13 Rural worker's cottage re-conditioned in its original style



FIG. 14 Pair of moorland cottages after re-conditioning



FIG. 15 A group of cottages reconditioned with the help of the maximum grant under the Rural Workers (Housing) Act



FIG. 16 Block of four Council houses specially erected for agricultural workers in the same village as those shown in Fig. 15. Details of comparative cost to public funds are given on page 547

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that besides its pleasing appearance the rooms of the cottages are cooler in summer and warmer in winter than those re-roofed with slate or asbestos.

Recondition or Build Anew?—Many authorities hold the view that it would be cheaper in the long run to allow cottages that appear to be past repair to become completely derelict, and to rehouse the tenants in new dwellings on a fresh site elsewhere.

The only possible method of providing new houses to let at rents within the means of agricultural workers is by special Exchequer and rate assistance, as was accomplished to a limited degree under the Housing (Rural Authorities) Act of 1931, or by special grants in connexion with slum clearance, and abatement of overcrowding.

New houses often mean additional expenditure on roads, sewers, lighting, etc., which reconditioning does not entail, and, in the opinion of those able to judge, many of the houses reconditioned under the Housing (Rural Workers) Act will render good service long after the twenty years contemplated by the Act have run.

Fig. 15 shows a block of dwellings reconditioned in a picturesque village with assistance of the maximum grant of £100 per dwelling under the Act, and Fig. 16 a block of four new cottages in the same village erected by the rural district council under the Housing (Rural Authorities) Act.

Comparative costs to Exchequer and local authorities are as follows:—

<i>Reconditioned Houses:</i>				£	s.	d.
Government	..	..	per annum for <i>twenty</i> years	3	10	0
County Council	..	..	" " "	3	10	0
Total				£7	0	0
<i>New Houses:</i>				£	s.	d.
Government	..	..	per annum for <i>forty</i> years	11	0	0
Rural District Council	..	..	" " "	3	0	0
County Council	..	..	" " "	1	0	0
Total				£15	0	0

The capital value of the subsidy for each reconditioned house is less than £100, and for each newly-erected rural worker's house more than £320.

Reconditioning in Urban Districts.—Although a "Rural Workers" Act, it is wrong to suppose that the Act applies solely to dwellings in rural districts. In one country

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town more than a hundred houses have been reconditioned under the Act, including more than one-half the dwellings in one street where the conditions were notably bad.

In another urban district a block of twelve "back-to-back" houses was converted into six dwellings that then complied in all respects with the standard required under the Act. Had the dwellings continued any longer in their previous state the local authority would have been compelled to issue a closing order.

The rents charged for these urban houses after reconditioning average just under 5s. per week, compared with an average of 3s. 9d. in the rural districts.

The Act should prove very useful to urban authorities when dealing with the question of overcrowding under the new Housing Act of 1935.

Overcrowding.—The Housing Act, 1935, which has recently received the Royal Assent, authorizes a local authority to purchase compulsorily houses or other buildings which are capable of being made suitable for occupation by the working classes, and directs the local authority then to proceed forthwith to secure the alteration, enlargement, repair or improvement of the houses or buildings either directly or by leasing or selling the property on conditions which will effect this object. In counties where the Housing (Rural Workers) Acts are operated by the County Council, this important provision will enable urban and rural authorities to receive the full grant under those Acts up to £100 per dwelling towards the cost of such alteration, enlargement, repair, etc.

A further provision in the new Act affecting rural housing is the setting up of a Committee to be known as the Rural Housing Committee. The Minister of Health is empowered by the Act to make, on the recommendation of this Committee, contributions of not less than £2 nor more than £8 per annum for 40 years towards the cost of providing new working-class houses for the abatement of overcrowding in a rural district.

The amount of the Government subsidy will vary according to the circumstances that exist in the different rural districts. Building costs, the sizes of the houses provided, and rents normally paid in the locality, will be taken into consideration. Where such houses are required for members of the "agricultural population," both the rural district council and the county council will be required to contribute £1 per annum in respect of each house for a period of 40 years.

Amendments to the Housing (Rural Workers) Acts.

—The Housing Act, 1935, extends the operation of the Housing (Rural Workers) Act of 1926 from September 30, 1936, to June 24, 1938. The new Act also makes it possible for local authorities, including county councils, to receive

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State assistance in respect of the reconditioning of property owned by them and occupied by rural workers, e.g., small holders.

Where the local authority carrying out these works is also the authority administering the Housing (Rural Workers) Acts, application for assistance must be made direct to the Minister of Health, and be accompanied by such plans, specifications and information as to rents to be charged, etc., as would have been submitted by a private owner to the authority when making application for a grant. Another important amendment is that owners may increase the rent by 4 per cent. (instead of 3 per cent.) on that part of the cost of works not covered by grant in respect of all dwellings where the reconditioning was completed or or after January 1, 1935.

The Future of Reconditioning.—It will be seen that there remain just three years in which owners who have not realized the possibilities of reconditioning may make up their minds whether to take advantage of the Act or not. In this comparatively short period it is hoped that, with the continued co-operation and assistance of the district councils and their officers, it may be possible to bring the number of reconditioned dwellings in Devon up to a total of 2,500. If this is done it will mean that at the very least some 10,000 rural inhabitants in that county will have been satisfactorily rehoused.

In the happy event of proportionately similar results being obtained in other parts of the country, the problem of the Minister of Health in regard to rural housing will have gone a long way towards its solution.

Housing (Rural Workers) Act, 1926 *Building Requirements—(Devon Scheme).*

The following notes indicate the principles upon which the Council's requirements are based. Special circumstances necessarily call for relaxation in some particulars, and such cases if represented, always receive sympathetic consideration.

Bedrooms.—Wherever possible a third bedroom is asked for; but if a house has two large bedrooms, this condition is sometimes waived on an undertaking being given that the house will only be let to a pensioner or childless couple. One of the deciding factors is whether accommodation for families is available in the vicinity.

One bedroom, at least, must have a fireplace; other bedrooms which have no fireplaces nor windows in two walls of the room, must have a hopped or louvered panel in or over the door or in the wall nearest to the staircase window to keep air in motion.

Staircase Window.—Wherever possible there must be a window on the staircase, but if this is not feasible, obscured glass louveres to give light and ventilation must be provided in the most suitable wall adjacent.

Food Storage.—Each house must have a properly lighted and ventilated food store, and the window opening must be protected with fly-gauze.

Wash-House.—Proper wash-house accommodation and a furnace pan must be provided for each house. The furnace pan may be placed in the scullery if this is suitable, or a detached wash-house

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with independent access may be used in common with other houses.

Dairy.—If a dairy is provided it must have an external door for independent access in case of infectious disease.

Partitions.—Partitions dividing bedrooms must not be constructed of a single thickness of boarding.

If, to avoid breaking up paving on a ground floor, a framed partition is used, the sill must have a damp course under it and stand on a brick or concrete plinth.

Slating.—Slating must be laid to a 4-in. lap, and, if of asbestos, must be slate-coloured. Ridges and hips must be similar in colour to the roof covering.

Cob Walls.—Any bare cob walls must be plastered and rough-cast.

Unceiled Rooms.—If the floor of the room above an unceiled room is not tongued, it must be protected by a counter floor or similar device.

W.C.'s and E.C.'s.—A separate W.C. or E.C. properly lighted and ventilated must be provided for each house. If an E.C. is provided it must be entered from outdoors, and there must be sufficient garden ground for satisfactory disposal arrangements.

W.C.'s may not be entered direct from a scullery or living room, and all new W.C.'s or existing indoor W.C.'s must be provided with flushing cisterns. Existing outdoor W.C.'s must be similarly equipped if a piped water supply is available or can be provided.

Drainage.—Drainage must be arranged with the Sanitary Officer and comply with the requirements of the Local Sanitary Authority. Each house must have a slop water gulley.

Water Supply.—Each house must have a suitable water supply. Wells must be safe from the danger of surface pollution and be provided with a pump, or syphonage arrangement if feasible. Where wells are not on the site of the dwelling, it must be proved to the satisfaction of the Committee that the right to draw water exists. The tops of wells must be covered with concrete and have an iron door for access, the door being kept well above the surface of the surrounding ground and the concrete being sloped away from the door on all sides.

Except in very special circumstances and subject to stringent conditions, rainwater is not accepted for drinking or culinary purposes; nor, except as a supplementary supply, for flushing W.C.'s, unless storage capacity is not less than 250 gallons and reserved solely for water for this purpose.

Washing-up Sinks.—A washing-up sink and draining board must be provided for each house, and it must not be placed in a living room.

Dampness.—Where there is evidence of the absence of damp courses in existing walls, protection must be provided by means of a water-proof cement plinth externally, and a similar dado set with lime plaster internally, of the requisite height. If the nature of the ground makes it necessary, a band of impervious paving must be carried round the house.

If the floor line is below the external ground, the surrounding earth must be excavated to a depth of 6 in. below the floor line; and where this involves a sunken area, the banks must be sloped back to allow free circulation of air and the area must be paved and drained.

Eaves Gutters.—Eaves gutters and down pipes must be provided to all dripping eaves; except that in the case of thatched eaves a concrete channel must be formed at the base of the walls, wide enough to receive the drip, and provision must be made for draining off water. A deep waterproof cement plinth must also be provided as a protection against the splash of dripping water.

Pavings.—There must be suitable paving around all external doors, and where necessary paved approach paths must be provided. Internal concrete floors must be laid on a bed of broken stone to avoid the condensation of water.

TAINT IN MILK DURING THE FEEDING OF MOLASSED BEET PULP

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FLAVOUR and odour are matters of first importance in connexion with the sale of milk. Tainted milk is not uncommon, but the majority of milk producers, nowadays, are aware of the various conditions responsible for such taints, and take measures accordingly. Occasionally, however, a new source of taint may arise, and it is then desirable that the cause, and methods of prevention, should be made known as widely as possible, in the interests of producer and consumer alike.

Origin of the Inquiry.—During the early part of 1929 a complaint reached the Midland Agricultural College from a Nottinghamshire farmer that his milk was tainted, the flavour and odour being described as “fishy.” The development of this taint had coincided with the introduction of molassed beet pulp into the ration.

A bag of the pulp was sent to the College, and when the pulp was given to a cow the fishy taint was reproduced in her milk. From appearance this pulp did not appear to be in any way abnormal. Inquiry revealed the fact that taints in milk, apparently caused by molassed beet pulp, had occurred on other farms. The information obtained, together with the results of preliminary work carried out at the Midland College, established the following points with reference to certain consignments of this food:—

- (1) That a pronounced disagreeable flavour and odour might occur in milk during the feeding to cows of reasonable quantities of molassed beet pulp in a normal ration.
- (2) That the evening's milk appeared to be more subject to the taint than the morning's milk.
- (3) That the objectionable taint was due to the presence in the milk of a volatile base—trimethylamine—which had been isolated and identified.

Inquiries by correspondence were made in several beet-producing countries in Europe with the object of ascertaining whether a similar effect had been observed previously,

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but no information of a positive nature was forthcoming. A search through Agricultural Scientific Journals revealed one paper only bearing on the subject. This paper was published in 1915 in Germany, by J. Rolle,* who stated that the feeding of excess quantities of beet imparted to the milk a bitter and unpleasant taste and disagreeable smell. Rolle concluded that this effect was due to betaïne, which combined with lactic acid in the milk. He also noted that "Lactic Acid Betaïne" with potash gave a characteristic "Herring Brine" smell.

In view of the importance of beet pulp by-products in establishing the sugar-beet crop in this country, the question of the causation of taints in milk by molassed beet pulp was brought to the notice of the Ministry of Agriculture and Fisheries, and a conference with representatives of the beet-sugar factories was held in July, 1929.

At this conference it was pointed out that large quantities of molassed beet pulp had been made and sold to farmers by the factories without giving rise to complaints as to tainted milk. However, in view of the few apparently genuine cases reported, it was decided to institute an inquiry into the cause of such a taint and the conditions under which it was likely to be produced.

A scheme of investigation was drawn up, and, during the winter of 1929-30, experiments were carried out at the Midland Agricultural College, the National Institute for Research in Dairying (Shinfield) and the Harper Adams Agricultural College. The results of the first winter's work were not uniform at all centres, hence further experiments on an agreed plan were carried out at the first two centres named during the winter season of 1930-31. In addition to these feeding experiments, research into the chemical processes involved was initiated in the Department of Advisory Chemistry at the Midland Agricultural College and in the Chemical Department at the National Institute for Research in Dairying. Further, efforts were made to obtain full information from all farms where the use of molassed beet pulp appeared to be associated with the production of tainted milk. A brief description of molassed beet pulp is given before dealing with the experiments.

Molassed Beet Pulp.—Molassed beet pulp is manufactured in Great Britain at most of the beet sugar factories.

* *Ztschr. Untersuch. Nahr. u. Genussmitl.*, 30 (1915), No. 10, 361-362.

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In the early years of the industry the beet pulp was dried without any admixture of molasses, the molasses being sold separately, but since 1928 it has been the practice of the factories to incorporate the molasses with the pressed wet pulp and then dry the mixture. The product has given very good results in stock feeding and, moreover, has proved to be a suitable means of disposing of two by-products of the sugar industry without the transport of large quantities of water.*

Beet molasses contains appreciable quantities of nitrogenous compounds of a soluble nature. One group of these compounds is designated the "betaine group," which is almost entirely absent in plain beet pulp, nor are these compounds found in cane molasses. There is considerable evidence that the primary cause of the fishy taint is the presence of one or more of this group of compounds, although betaine and its allied compounds do not possess a fishy taste or odour. Examination of fishy samples of milk showed the presence of a compound named trimethylamine, which was, in fact, isolated and identified. Trimethylamine is a colourless liquid (boiling point 3.5°C.), possessing a strong fishy taste and odour. Under certain conditions betaine and its allied compounds are capable of being broken down, trimethylamine being produced. Whether the chemical changes involved in this breaking down of betaine take place during the drying of the molassed pulp, in the process of digestion, or during milk secretion, is not yet known. Research is needed to solve this problem.†

Standard Feeding Experiment, 1929-30.—The experiments carried out at the three centres during the winter of 1929-30 were on the following lines:—

A consignment of molassed beet pulp of average quality and appearance was sent from one factory to each of the three centres in December, 1929. Six normal cows were selected and divided into two groups of three each. The control group received throughout the experiment a maintenance ration of 12 lb. hay, 4 lb. oat straw, and 30 lb. mangolds, and a production ration of $3\frac{3}{4}$ lb. per gallon of

* Pressed wet beet pulp contains about 80 per cent. water and beet molasses about 20 per cent. water.

† Since this Report was written, research on the lines indicated has been started and is still proceeding (August, 1935).

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milk of a concentrate mixture made up of 10 parts crushed oats, 3 parts maize gluten feed and 3 parts extracted soya bean meal. The experimental group received the same ration, except that the proportion of crushed oats was modified according to the amount of dried molassed beet pulp given. During the first week both groups received the above ration without any pulp; during the second, third and fourth weeks the experimental group received increasing quantities of pulp, viz.—second week, 3 lb. per head one hour before the morning milking; third week, 3 lb. per head one hour before each milking, i.e., 6 lb. per head daily; fourth week, $4\frac{1}{2}$ lb. per head one hour before each milking, i.e., 9 lb. daily. The pulp was soaked overnight in three times its weight of water.

At the Harper Adams College dried molassed beet pulp supplied by a second factory was given to another group of cows under similar conditions.

In view of the possibility of the dried molassed beet pulp deteriorating on storage, the experiment described above was repeated at the Midland College and at Shinfield during March and April, 1930, using the remainder of the original consignment of pulp.

During all these experiments, samples of milk were taken at every milking from each cow in both groups and were put into sterilized bottles closed with loosely-fitting glass caps. These samples were tasted whilst warm and, subsequently, morning and evening for two days. The tasting was undertaken at each centre by experienced persons, and any samples of a doubtful character were submitted to other individuals for confirmation. The identity of the samples was concealed, by means of numbers, from the persons responsible for the tasting.

Summary of Results.—Under the conditions of this experiment as set out above, no samples of tainted or fishy milk were discovered at Shinfield, nor at the Harper Adams College. On several occasions slight differences in flavour from that of normal milk were noticed and described as "sweet" or "salty," but these flavours did not persist, and, as they occurred in the control group as well as in the experimental group, they could not be ascribed to the influence of the molassed beet pulp.

At the Midland College, eleven samples of fishy milk were recorded in the first experiment, all evening's milk. These were distributed as follows:—On 6 lb. molassed beet pulp

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three out of twenty-one samples (14 per cent.); on 9 lb. molassed beet pulp eight out of twenty-one samples (38 per cent.). During the second experiment at this centre two samples only of fishy milk were recorded, both from one cow during the 9 lb. molassed beet-pulp period. In addition to the tainted samples produced by the experimental group when molassed beet pulp was given, two cows were found to produce occasional samples with a fishy taint when the ration did not include any molassed beet pulp. It is well known, however, that many herds contain cows that will produce milk possessing an abnormal taste and odour occasionally, although receiving a normal ration.

The marked difference in the number of tainted samples in the two experiments at this centre may have been due to the fact that during the interval of five weeks between the two experiments all the cows received a small quantity of molassed beet pulp (about 2 lb. per head daily) in their ordinary ration, and it is possible that they may have become accustomed to dealing more effectively with this food. It is also possible that the pulp used was not of a definitely taint-producing type, since no case of a taint was reported during this interval, whereas, with other types of pulp, 2 lb. has been sufficient to cause a taint.

Discussion of Results.—In comparing the results of the standard experiments at the three centres one must give due weight to any factors that vary from centre to centre. Such factors are:—

- (a) Individuality of the cows.
- (b) Times of feeding molassed beet pulp in relation to hours of milking.
- (c) Individuality of the experimental staff.

(a) *Individuality of the Cows*, i.e., capability or otherwise of the cow to prevent any taint-producing compounds gaining access to the milk. The incidence of this factor cannot be measured, and it is not possible to say to what extent the results at the different centres had been influenced by the animals used; the fact that at one centre fishy samples were obtained from two cows not receiving molassed beet pulp adds to the difficulties in this respect.

(b) *Times of Feeding and Milking.*—The interval between feeding and milking varied slightly between the centres. At Shinfield the pulp was fed one hour before milking; at Harper Adams College just before milking; and, at the Midland College either at milking or immediately preceding milking. These small differences in times of feeding in rela-

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tion to milking are not likely to have been responsible for the variation in results, since the times at the Harper Adams College and at the Midland College were almost identical. The results, however, did not agree, and further, all the tainted samples observed at the Midland College occurred in the evening's milk.

(c) *Individuality of the Experimental Staff.*—It is well known that the ability to detect a taint varies with individuals, and that a change in flavour that is not unpleasant to some observers would be definitely distasteful to others. Further, the nomenclature of flavours is by no means uniform, and the same sample may be described in different terms by various observers. In this experiment the staff examining the milk samples at the three centres could not be standardized, and this may account to some slight extent for the differences in the results obtained; nevertheless, a fishy flavour is one of the most distinctive of taints, and when definitely present is easily detected. To safeguard against errors due to individuality of taste, it would be desirable, in future experiments, wherever a taint is suspected, that the milk should be examined by several people.

Supplementary Experiments.—A. At the Harper Adams College a second experiment was conducted in February and March, 1930, in which the times of feeding relative to milking were varied. The results obtained are summarized as follows:—

- (1) 9 lb. of molassed beet pulp given to all cows at 6.15 a.m. resulted in a strong fishy odour and taste being present in the milk of all the cows at the evening's milking (4.30 p.m.). This taint could not be detected in the morning's milk (milking 7 a.m.).
- (2) When 9 lb. of molassed beet pulp were given to all cows at 3.30 p.m., no definite taint appeared in milk from either milking. This confirmed the last stage of the standard experiment. A sample drawn from the cows at 12 midnight showed decidedly the presence of taint, suggesting that both time of feeding and quantity of pulp are factors to be taken into account.
- (3) Feeding 6 and 7 lb. of molassed beet pulp at 6.15 a.m. produced slight taints in the evening's milk, but rather irregularly.
- (4) Feeding 8 lb. of molassed beet pulp at 6.15 a.m. produced pronounced taint at the evening milking only in one cow, and less definite taints in two others. Sampling at short intervals (11 a.m.) showed the presence of definite taint in all three experimental cows at this earlier stage of secretion, but this had disappeared by the usual milking time (3.30 p.m.).
- (5) When 12 lb. were fed to each cow in two equal parts (at 6.15 a.m. and 3.30 p.m.), taints were present both in the evening and morning, in the case of the one cow that cleared up the ration.

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B. At the Midland College, a consignment of over-heated molassed pulp (black pulp) was purchased in the open market and fed to the College herd at the rate of 2 lb. per head per day in a normal ration. Tainted milk was immediately produced at both morning and evening milkings. When the pulp was replaced by a non-burnt sample (grey pulp) the taint disappeared, but on reverting to the black pulp the fishy taint returned. These results indicate that the quality of the pulp as influenced by the method of manufacture is an important factor in the production of a fishy taint.

Standard Experiment, 1930-31.—In view of the variation in the results of the experiments carried out at the three centres during 1929-30, it was decided to extend the scope of the experiments during the 1930-31 season, as follows:—

- (1) A repeat experiment on the same basis as the previous season, giving $4\frac{1}{2}$ lb. molassed beet pulp twice daily.
- (2) A first time-interval experiment in which the experimental group was given $4\frac{1}{2}$ lb. molassed beet pulp immediately before each milking for seven days; at the morning milking all cows were milked out as usual, and at two-hour intervals during the day small samples were drawn from each cow, and tasted twice daily as in previous experiments.
- (3) A second time-interval experiment on the same lines as (2) above, except that each cow was completely milked out at two-hour intervals during the day.

Experiments according to the above programme were carried out at the Midland College and at the National Institute for Research in Dairying. As in the previous season, molassed beet pulp, normal in character, was supplied to both centres from one factory. The ration was similar to that fed in the previous year, except that straw was replaced by additional hay, and maize gluten feed was replaced by palm kernel cake. Before commencing the experiment the milk of each cow selected was tested for volatile bases for the purpose of discovering any abnormality in milk secretion that might be a predisposing cause in the production of a taint. All the cows used appeared to be normal in this respect.

Summary of Results: (1) *Repetition of Previous Year's Experiment.*—At the Midland College variable flavours were reported in the milk of all the cows, one cow in the experimental group and one in the control group giving milk on one occasion which was reported to possess a fishy flavour.

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At Shinfield no tainted samples were observed, but it was reported that the flavour of the milk from the three experimental cows was slightly abnormal, being in fact somewhat sweeter than usual.

(2) *First Time-interval Experiment.*—At the Midland College 15 samples (18 per cent.) of definitely fishy milk were obtained, but these were produced by two of the cows only. The third cow on no occasion produced tainted milk. Seven of the 15 samples occurred at the 12.30 p.m. sampling. In all instances the taint was not observed immediately after milking, but developed 12 to 36 hours afterwards. Many of the samples from both groups of cows were "salty" to taste. Again one of the control group of cows was reported, on one occasion, to have produced milk with a fishy flavour.

At Shinfield no definite taint was observed, but more variability was noticed in the milk from the experimental group, a "salty" flavour being noticed in most of the samples taken during the day.

(3) *Second Time-interval Experiment.*—At the Midland College two cases of fishy milk were reported (one from each of the two cows) in the control group, and two cases from one cow in the experimental group. The taint developed on keeping, and in three instances was only noticeable when the milk was heated. At Shinfield no tainted samples were found; one cow in the experimental group gave milk of a rather strong flavour, but there was no indication of fishiness, and the flavour decreased with age.

Supplementary Experiments.—At Shinfield, a third time-interval experiment was carried out in which the ration was modified by giving a maintenance ration of three parts mangolds, and one part silage. The daily allowance was 70-80 lb. per head to the control cows and 45-50 lb. to the experimental cows along with 9 lb. molassed beet pulp per head daily; no hay or straw was given. The production ration consisted of a mixture of concentrates fed at the rate of $3\frac{1}{4}$ lb. per gallon of milk. The molassed beet pulp was soaked as usual and $4\frac{1}{2}$ lb. were given to the experimental cows 1-1½ hours before the morning milking and a similar quantity 2 hours before the afternoon milking. The cows were selected to include in the experimental group, animals—(a) giving a high yield (57 lb. milk daily), (b) well

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advanced in lactation (16 lb. milk daily), (c) susceptible to udder trouble.

No peculiar taint or fishy flavour was noticed in any sample. Samples from the cow "advanced in lactation" usually had a distinctively "strong" and "salty" flavour. The other cows gave normal milk, with occasional samples possessing a more pronounced flavour than others. None of the flavours, however, could be considered abnormal, and the individual variations were such as are commonly found when samples are tested critically. No abnormal flavour developed when the samples were heated.

A fourth time-interval experiment was begun in which the afternoon's allowance of molassed beet pulp was fed four hours before milking. The experimental feeding, sampling and tasting were continued for four days only, because the increase in the amount of grass that could be obtained out-of-doors during the day lessened the appetite of the cows for molassed beet pulp and other foods given indoors. During this short period no definite taint or fishiness was found in any of the samples.

General Conclusions.—The results of the experiments at different centres described above are not in complete agreement, and it is difficult to give adequate explanations of this lack of uniformity. Nevertheless, the experimental work and the observations made of cases of taints that have occurred at different farms lead to the following general conclusions:—

- (1) Certain consignments of dried molassed beet pulp have given rise to a taint in milk.
- (2) In pronounced cases the taint is decidedly "fishy," but in mild cases a "musty" or "egg-like" flavour is noticed, and there are indications that an especially sweet taste is a precursor of the taint. Occasionally the abnormal flavour will only be noticed by persons who possess a very keen sense of taste or smell.
- (3) When the taint is definite it will be noticed in cold milk, but heating the milk renders detection much more easy. In some instances, the fishy taste and odour do not develop immediately but appear after the milk has been kept for some hours.
- (4) Some types of dried molassed beet pulp are more likely to give rise to a taint than others. There appears to be greater risk of a taint being caused by dark-coloured pulp than by light-coloured pulp.
- (5) Certain cows appear to be more subject to the production of tainted milk than others.
- (6) Feeding experiments have given some indication that the time-interval between feeding the pulp and milking is an important factor in the production of a taint. It appears that when pulp is fed more or less midway between milkings there is greater

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likelihood of taint than when the pulp is given immediately before milking or during milking.

- (7) A daily allowance of up to 9 lb. per head, in two feeds, may be given, but this quantity should be reduced if beet tops are being given at the same time.
- (8) Subject to the observance of these simple safeguards and to the pulp being of normal character, the risk of taint would seem to be small.

Acknowledgment is made of the co-operation and assistance of various members of the staffs of the Midland Agricultural College, the National Institute for Research in Dairying, and the Harper Adams Agricultural College. The writers are indebted also to Dr. Charles Crowther for valuable co-operation and criticism in the course of the investigation. Their thanks are also due to the Beet Sugar Factories' representatives on the Sugar-Beet Research and Education Committee, who, throughout this investigation, have whole-heartedly supported the granting of funds necessary for the experimental and laboratory work involved.

This report deals specifically with the effect of Dried Molassed Beet Pulp in the ration of dairy cows. It is known that sugar-beet leaves and tops and wet pulp, ensiled, are more active agents in the production of an undesirable taint in milk. Information on this will be found in the following papers:—

1. "Cause of Beet Odour and Taste in Milk and Butter." P. Post. *Z. Unters. Lebensm.*; 1931, 61.
2. "The Specific Influence of Sugar-Beet Leaves and Slices on the Quality of Milk." C. Zwagerman: *Int. Dairy Congress Papers*, 1931.
3. "Sugar-Beet Pulp and Sugar-Beet Tops as feed for Dairy Cattle." V. Steensberg: *Int. Dairy Congress Papers*, 1931.

SOIL SURVEYS AND THEIR APPLICATIONS

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IN an earlier article in this JOURNAL,* the writer described the methods used in the preparation of soil maps, and alluded briefly to possible uses of soil surveys. Soil survey work has since been proceeding in various parts of England and Wales, and it may be of interest to consider at greater length its possible applications in the light of the additional experience that has been gained.

The most immediate practical utility of soil surveys is, of course, in connexion with advisory work. In North Wales, field work in a district leads to a considerable increase in the number of inquiries from farmers. Out of about 200 soils reported on annually nearly one-half may be said to have come to notice through the soil survey work. The same is probably true of other provinces in which this type of work is being carried out. It may be noted that many of the inquiries come from farmers and others who would not, in the ordinary way, approach the provincial centre for advice.

The detailed mapping of an area leads to an intimate knowledge of the chief deficiencies, e.g., lime deficiency, and their distribution. Whilst the soil maps cannot pretend to show the plant nutrient status of each individual field, they can show the general characters of soils and indicate areas where particular types of improvement are urgently needed. In Wales, we have come to recognize certain soils as subject to lime deficiency, and others to phosphate deficiency.

The utility of soil maps may be expected to increase as they become more complete. Only when large areas have been mapped is it possible to know what kinds of soil are actually present, and to correlate soil characteristics with agricultural performance. In the West Midlands and in Wales, the areas now mapped are sufficiently extensive for general inferences to be drawn.

For ordinary soil survey purposes the unit of classification is the soil series. By a soil series is meant a group of soils

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developed under similar conditions from the same or similar parent materials, and showing the same general characteristics in the soil profile (i.e., the succession of horizons down to the geological parent material). For example, the Salop series is a group of soils derived from heavy Triassic boulder clay, mainly Keuper Marl, with varying degrees of drainage impedance. The profile consists of about one foot of dark reddish-brown loam passing through a transition horizon, which generally shows signs of drainage impedance, to an almost stoneless stiff reddish clay having a slight purplish tinge with occasional greenish-grey or yellowish mottlings. The parent clay sometimes contains sandy pockets, and is either slightly calcareous or else contains a fairly high proportion of exchangeable lime. Soils of this series are heavy working. Formerly they were good wheat and bean soils, but are now generally down to grass, some of the best dairy grounds of Cheshire being on this series. They do not generally suffer from potash or lime deficiency, but are responsive to phosphates. Drainage is often poor, particularly where the raw clay is near the surface. Mole draining might be extensively used with advantage.

The series is further sub-divided into types according to texture. Thus the Salop series may include Salop medium loam, Salop heavy loam and Salop clay. Generally speaking the texture range within a series is not wide, for a considerable variation in texture would introduce such differences as to make necessary the recognition of a separate series.

The small textural distinctions within a series may be of considerable importance in certain instances, particularly where it is a question of growing crops that are not generally suited to the series as a whole. To take a hypothetical case, textural distinctions might be of critical significance in deciding the feasibility of growing crops such as potatoes and barley on a series with generally heavy textures. Similarly in a series in which the texture is generally on the light side the occurrence of the heavier types would assume a special significance for the growth of crops such as wheat and beans, or for the establishment of pastures.

Soils of the same series may be expected to show the same general agricultural characters, but considerable differences are introduced by cultivation and manuring. Reviewing the actual state of an area occupied by one soil series, it may happen that in some places, either whole farms or

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individual fields, productivity is distinctly below that of the area as a whole. This may be attributable to neglect or to faulty methods of cultivation and manuring. A detailed examination of the soils of such localities will at once show in what respect the soils are inferior, and indicate the means of improvement to be used in order to bring them up to the general standard of the series.

The application of the soil survey to advisory work can only attain its full value when it is supplemented by carefully planned field experiments. Much of the field experimentation in the past, including both manurial and variety trials, has suffered through the fact that it has been located without reference to soil series and types, and consequently the extent to which the results of individual experiments could be applied was unknown. When it is recognized that a large area is occupied by a given series, it is important that experimental work should be instituted to discover the best system of cropping and manuring for that series. A beginning has already been made in the investigation of the manurial requirements of certain important soils in the West Midland province, and it is extremely desirable that this work should be extended as soon as the soil survey reveals the wide occurrence of certain series.

Pending the establishment of experimental work on the more important soil series, much can be done, and is being done, to interpret existing experience by collecting relevant data for the series that have been recognised. In this connexion it should be of value to enlist the co-operation of agricultural organizers and others who are continually in touch with the problems of farmers and growers. Naturally, this co-operation cannot be sought until considerable areas of soil are mapped. The usefulness of the survey and opportunities for co-operation will grow as the work becomes more complete. One of the tasks of the surveyor is to convince those immediately concerned with the education of the farmer of the objective existence of the series he is mapping. It may be expected that many of the problems of cultivation and manuring with which the organizer is confronted would assume a new aspect if viewed in the light of the results of a soil survey.

Soil surveys can be carried out in differing degrees of detail according to requirements. For some purposes, a reconnaissance survey might be of value, particularly in regions of fairly simple geology and topography. For

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ordinary routine purposes, however, it is more convenient to map on the scale of 6 in. to the mile, using the Ordnance Survey sheets as base-maps. By this means it is possible to ensure that all the important varieties of soil are located and that the boundaries inserted bear a fairly close approximation to the truth. Most of the soil survey work actually in progress is done in this way.

There is a third type of survey which may be carried out in special cases, namely, a detailed survey on a larger scale, such as 25 in. to the mile. Such mapping is required where intensive utilization is proposed, for example, fruit culture, or market gardening. A number of surveys of this kind have been made in the North Wales area. They call for the inclusion of finer distinctions of texture and other soil conditions than could be recognized and mapped in ordinary routine practice. The maps produced may be expected to give fundamental information for the regulation of existing practice and the guidance of future development. This type of work is undertaken only when specially required.

Apart from instances calling for detailed maps of areas proposed for intensive utilization, special maps on the 6-in. scale may be made of areas under ordinary agricultural use. These may be large farms, or groups of farms, where it is possible to outline a uniform policy for a considerable area. The mapping is accompanied by fairly intensive sampling, and reports are made embodying practical recommendations. The extension of this type of work would be welcomed, since without any appreciable diminution in the rate of progress, the survey work is directly linked up with practical agriculture.

An important aspect of the soil survey, which has received particular attention in certain areas, notably in the West Midlands, is the study of soils from the point of view of their agricultural history. In a long-settled country such as Britain, particularly in the south, soils are, if not actually artificial, profoundly modified from their original state by the activities of man. There is evidence for believing that, over considerable areas, this activity has resulted in a raising of the level of fertility. At the same time the knowledge that these soils owe their fertility to cultivation and manuring supplies a warning as to the undesirable consequences to be expected from any remission of effort through lowering the standard of farming.

This is illustrated by information supplied by Mr. W.

SOIL SURVEYS AND THEIR APPLICATIONS

Morley Davies about the Bridgnorth series. The soils of this series are light-textured deep soils with free drainage. The parent material is Bunter sandstone. Although they are very fertile under good management, neglect may soon lead to serious consequences. The effect of a dressing of 25 cwt. per acre of ground limestone disappears completely in six or seven years, whilst potash seems to be equally fugitive. To maintain these soils at a satisfactory level, regular calcareous dressings are required, in addition to all-round manuring with nitrogen, phosphates, and potash. Organic matter must be maintained, since open texture leads to its rapid disappearance.' Finally, special attention is required in order to keep down weeds, of which couch grass is possibly the worst offender.

The writer can adduce similar instances from North Wales. There, the soils are generally devoid of a natural supply of calcium carbonate. This deficiency was supplied in past years by regular and heavy dressings of lime or other calcareous materials, and the residues of these dressings have ensured for a long time a satisfactory lime status. There is, however, a steady loss by drainage, estimated at about 2 cwt. of lime per acre per annum. The result is that an increasing proportion of land is suffering from sourness, with consequent depression in crop yields and deterioration of grass land. There is evidence of a similar fall in phosphate status. From the soil map, certain kinds of soil can be indicated as specially subject to deterioration. Unless efforts are made to forestall this condition, it may be expected that productivity both of arable and grass land will fall considerably within the next generation.

The soil survey is of service in studying the adaptation of soils to particular crops. This is particularly true of specialized crops such as fruit and vegetables, the extension and improvement in culture of which is so desirable from the national economic standpoint. Bearing in mind the high initial and working costs of such specialized cultivations, it is of the highest importance that new developments should only be instituted where there are good prospects of success.

With these considerations in mind, a great deal of work has been carried out in fruit-growing areas to determine the soil conditions associated with the successful growth of particular crops. The areas selected for study were the fruit areas of Cambridgeshire, Kent, Worcestershire, and

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Herefordshire. A considerable body of information has been collected and is now available in a series of publications by the Ministry.*

It is not possible to summarize the results of these investigations, but it is evident that each area has its own particular problems. For example, in West Cambridgeshire, the work has shown the importance of the position of the water table. In light gravel soils over clay, whilst a water table at 3 ft. in winter and 6 ft. or more in summer is consistent with successful growth of apples, a deeper water table means leaf scorch and eventual dying back of the trees. In the West Midland areas, the successful growth of fruit trees on coarse-textured sands depends on the presence of beds of marl below the surface. In Kent, soil water conditions linked with the depth and consolidation of the soil have been shown to be of first importance for tree growth. The adaptation of particular rootstocks to particular soil conditions has also been shown.

In each of these areas several varieties of soil profile have been recognized and correlated with the growth of fruit trees. With the data available it is now possible to make some prediction as to the possibility of further extensions of particular types of fruit culture in these districts. To what extent these data can be transferred to entirely new areas is not known. Due regard would have to be paid to climatic conditions, for the growth of fruit in the moist and mild climate of the west is quite different from that in the east with its more continental type of climate. The data obtained on the Old Red Sandstone soils of the West Midlands are probably applicable to similar soils over most of the border counties and South Wales, whilst the Cambridgeshire results should be valid for similar soils in East Anglia.

The soil map, taken in conjunction with experience in fruit-growing areas, can also be used to indicate areas where certain types of culture should be avoided. For example, strawberries appear to be specially subject to

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- * (1) A Survey of the Soils and Fruit of the Wisbech Area: C. Wright and J. F. Ward. Min. Agric., Research Monograph No. 6, 1929.
 - (2) Fruit Growing Areas on the Old Red Sandstone in the West Midlands: T. Wallace, G. T. Spinks and E. Ball. Min. Agric., Bul. No. 15, 1931.
 - (3) West Cambridgeshire Fruit Growing Area: J. F. Ward. Min. Agric., Bul. No. 61, 1933.
 - (4) Fruit Growing on the Lower Greensand in Kent: W. A. Bane and G. H. G. Jones. Min. Agric., Bul. No. 80, 1934.

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chlorosis on calcareous soils deficient in iron; raspberries are particularly susceptible to summer drought or seasonal waterlogging; and gooseberries are unsuccessful on any soils where the supply of potash is not plentiful.

Apart from the systematic investigations of fruit soils in fruit-growing districts, it is frequently possible to note, in the ordinary routine soil survey, the conditions under which successful fruit culture is being carried out. For example, deep colluvial shale soils of the Penrhyn series give good results with apples in the drier and sunnier parts of North Wales. From the soil map it is possible to indicate similar localities where successful growth might also be expected.

The studies that have been made in the fruit-growing area indicate the great complexity of the problem and the need for further work. With the improvement in methods of soil description and soil analysis, it should be possible in the future to define more closely the conditions requisite for success in the growth of the different kinds of fruit permitted by our climate. This must result in the improvement of methods in existing areas and the extension of fruit culture on sound principles into new areas.

At the other extreme from the intensive investigation of highly-cultivated areas is the survey of rough upland grazings. With the limited resources available for soil survey work, effort is at present directed almost entirely to the mapping of agricultural soils. Yet the soils lying outside the limit are of considerable importance in a region such as Wales where they contribute appreciably to the total production of live stock. Eventually these soils must be mapped, for the problems are similar to those of agricultural soils. Here also there is the possibility of improvement and the tendency to deterioration under exhaustive grazing. In North Wales, these lands include thousands of acres that were formerly in cultivated holdings.

The survey of rough grazings and waste lands is of importance in schemes of afforestation. Whilst the forester must generally take what land can be spared from sheep walk, it may be necessary at some future date to approach the problem of trees *versus* sheep from a national standpoint. The character and distribution of the soils should certainly be factors in deciding the issue. Whilst dealing with the question of afforestation, the soil surveyor may venture to direct attention to the possible dangers attending the general planting of conifers. On soils poor in base

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reserves and under high rainfalls, it is possible to foresee soil degeneration in future generations.

Soil surveys may be of considerable value in connexion with housing schemes, both in the vicinity of towns and also in rural districts. The information carried on the soil maps bears both on the selection of housing sites and also on the utilization of adjacent land for gardens, allotments, open spaces, and playing fields.

The value attached to free drainage for housing sites is shown by the frequency with which "gravel soil" is cited as a recommendation in advertisements of house property. Some indication that this preference for freely drained sites is well founded was furnished in a recent report on tuberculosis in a Welsh county, in which it was shown that the incidence of the disease was lower in villages shown on the soil map as having free drainage.* The soil map can indicate at a glance areas suitable for housing sites.

In modern housing development, importance is rightly attached to the utilization of land other than that occupied by dwellings. In most housing schemes, gardens are a prominent feature, and it is very desirable that, as far as possible, the land should be suitable for this type of development. Generally speaking, the light well-drained soils which are suitable for building sites are also suitable for horticultural development. In addition to indicating the location of such areas the survey can also be of assistance, through the local advisory service, in indicating the methods of cultivation and manuring most likely to be successful in the establishment of gardens. In the same way the soil survey can furnish information of use in the development of playing fields and open spaces.

Another aspect of housing development that merits consideration is the encroachment of housing schemes on to market-garden areas near towns. The soil map can indicate areas suitable for the re-location of market gardens and allotments thus displaced.

In most of the areas where housing development is taking place, no soil survey has been carried out. The writer would suggest that a soil survey should be a necessary preliminary to any big scheme of housing or town planning. By this means it would be possible to secure development

* H. D. Chalke: An Investigation into the causes of the continued high death-rate from tuberculosis in certain parts of N. Wales. King Edward VII Welsh National Memorial Association, Cardiff, 1933.

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along right lines. Unfortunately large areas are being developed without such preliminary survey, and it is inevitable that mistakes will be made by the selection of unsuitable sites.*

In the foregoing remarks, reference has been made to the value of soil surveys both in helping towards a solution of the problems of to-day and in guiding the development of to-morrow. In the remainder of this article the writer proposes to discuss this second aspect of soil surveys.

It seems evident that in the future the utilization of our land for productive purposes will be less haphazard than in the past. Whilst the principles of *laissez-faire* and the survival of the fittest may eventually lead to a national agriculture in perfect equilibrium with other national activities, the stages of adjustment may be long drawn out and painful both to agriculture and to national life. Some attempt at planning the future of our agriculture, our horticulture, and our forestry, or in other words, how we shall use our soil, seems inevitable.

Even if it is decided that our best policy is the restriction of production, there is no escape from the necessity of using forethought in deciding where and how this restriction shall take place. Still less can we omit forethought if we are to increase production by exploiting the possibilities of our climate and soil.

Marketing schemes, subsidies, and quotas, however necessary they may be for the present existence of agriculture, have nothing to do with the fundamental factors, soil and climate, that underlie all production. Yet it is these factors that determine the changing picture of our countryside and mark out this region as suited for fruit, this for potatoes, this for dairying, and that for grazing.

In the development of our agriculture, however, human and economic factors have entered, and the existing utilization of the soil of a particular district does not necessarily mark the full extent of its potentialities. Within living memory, whilst large areas, such as our former wheat lands, have diminished in productivity through enforced neglect, other areas have come into more intensive use. There is

* The writer was recently consulted about a site for playing fields in connexion with a big suburban housing scheme. On surveying the area it was found that only a small proportion was suitable for this purpose. The remainder, however, offers good possibilities for market garden development if drained, and there is a good prospect that this work may shortly be put in hand.

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no doubt that if economic considerations or national emergency supplied the incentive, a general rise in the level of production could take place.

Facing a future that offers little promise of stability, but rather the prospect of continual change, it would seem a reasonable measure of foresight to secure an inventory of our natural resources. One of the principal aims of the soil survey work that is at present being carried out in different parts of the country is to provide such an inventory.

The completion of the survey is a task that will occupy many years at the rate of progress at present possible. Its value as an inventory will grow in increasing proportion with its approach to completeness, for the full implications of the soil map of one region cannot be seen until comparisons with other regions are possible. Soil surveys must thus be regarded as long-range research work, which, although it yields immediate results by its assistance to current advisory work, may be expected to perform its greatest service by providing fundamental data for the guidance of planned development in future years.

THE BACON DEVELOPMENT SCHEME

THE Bacon Development Scheme (Approval) Order,* made by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland on August 6, 1935, approves the Bacon Development Scheme which was submitted to the Minister by the Pigs and Bacon Marketing Boards on May 17, 1935. The scheme, which applies to Great Britain, will come into force on September 7, 1935. It will be the first scheme of its kind to be brought into operation under the Agricultural Marketing Act of 1933.

The Development Scheme completes the structure of organization for the pig industry which was recommended by the Lane-Fox Commission. This, it will be recalled, consisted of a marketing board for pigs and another for bacon, with a development or co-ordinating board entrusted with the execution of plans for rationalizing bacon production and performing services in which both sides of the industry are jointly interested. The Commission regarded the Development Scheme as the corner-stone of their plan. "It is right," they said, "but it is not sufficient, for pig producers and for bacon curers to be organized in water-tight compartments for the better control of their own affairs; they have so much in common on which the welfare of the whole pig industry requires that they should speak as one industry. We do not suggest that the Pig Industry Development Board should usurp any of the autonomy of the Pigs or Bacon Marketing Boards, or that pig producers should control or be controlled by bacon curers; we suggest only that considerations of common policy should be settled by a properly representative body to which, for reasons of economy, there might also be entrusted certain executive services for the development of the industry as a whole. In this joint body is developed the idea of co-operation, in accordance with the spirit and intention of the Agricultural Marketing Act, between the various sections of the industry upon which its success in the future must depend."

The Development Board will consist of 11 members—the Chairman and two other members appointed by the

* S.R. & O., 1935, No. 781. Obtainable from H.M. Stationery Office at the addresses given on the cover of this JOURNAL, price 4d. net, post free, 5d.

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Minister of Agriculture and the Secretary of State for Scotland, 4 elected by the Pigs Marketing Board from among their members, and 4 similarly elected by the Bacon Marketing Board. No meeting of the Board will be properly constituted unless there are present at least one of the appointed members and one representative of each of the Marketing Boards. Provision is also made for ensuring that all Committees appointed by the Board from among their members shall include representatives of each of these classes.

The Board must appoint a Retailers' Advisory Committee consisting of not more than 12 representatives of bacon retailers' organizations, to advise the Board on matters affecting the retail trade in bacon. They may also appoint other advisory Committees.

MAIN POWERS OF THE DEVELOPMENT BOARD

The powers of the Development Board fall into two classes:—

- (a) *mandatory* powers to license factories; and
- (b) *permissive* powers, which are concerned mainly with the exercise of functions delegated to them by the constituent marketing boards.

Mandatory Powers.—The most important powers bestowed upon the Development Board by the scheme are undoubtedly those of licensing bacon factories. The Lane-Fox Commission drew attention to "certain conspicuous weaknesses" of the curing industry. The particular points to which reference was made, as regards the structure of the industry, were the existence of redundant capacity and the unsuitable situation of factories. Emphasis was also laid on the necessity for the efficient equipment of factories and the production by curers of the types of bacon most in demand.

After an increase of over 50 per cent. in output as the result of the marketing schemes, bacon factories in this country are working at only 70 per cent. of capacity. The under-utilization of capacity is due mainly to the excessive number of factories compared with the supply of pigs available.

Low turnover seriously increases costs. One British factory has estimated that an increase in turnover from 50 per cent. to 100 per cent. of capacity would reduce costs by one-third.

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The question of suitable siting of factories, having regard not only to supplies of pigs, but also to facilities for the marketing of the bacon and offals, is again of the utmost importance; the home industry as it develops needs to be intelligently planned in relation to these factors, and not allowed to grow up haphazard.

Factory equipment, it goes without saying, has a direct bearing on costs and quality of product. As regards offal utilization alone, there is scope for large savings in overhead costs and for the production of increased quantities of cheap foodstuffs.

The question of the type of bacon produced by curers in this country has assumed added importance as a result of the replacement of a large proportion of foreign bacon, by English, during the past three years. To ensure that the public continue to get the mild tank-cured type of bacon to which they have been accustomed from foreign sources entails, as the Lane-Fox Commission pointed out, a considerable change-over in the type of bacon produced by British curers. British factories have, in fact, expanded very considerably their tank-curing *capacity* since the scheme started; it is estimated by the Bacon Board that there is now twice as much tank capacity as in 1932. There is a market for both types of cure and the obvious need is for some organization to regulate the laying down of new plant so as to ensure that the required quantities of all the various kinds of bacon are produced.

The Licensing Provisions.—The licensing powers of the Development Board are designed to remedy the weaknesses of the industry in respect of all these matters. The scheme prescribes that, as from the appointed day* no person (unless he is exempt from registration under the Bacon Marketing Scheme) may produce bacon in Great Britain in any premises except such as are licensed by the Development Board. The Development Board may attach to a licence such conditions as they think fit (having regard to the interests of pig producers and bacon curers) for promoting the efficient production of bacon or reducing excessive production of bacon. The Board may exempt from the licensing provisions of the Scheme such classes or descriptions of curers or the production of such description of bacon, as they may determine.

* Appointed day means such day, not being earlier than January 1, 1936, nor later than January 7, 1936, as may be fixed by the Development Board.

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Licences will expire on December 31 in each year, but are automatically renewable on expiry unless it appears to the Development Board that the situation of the premises is unsuitable, or that they are not equipped for the efficient production of bacon, or unless a producer's licence, previously granted in respect of the premises, has been revoked, or the holder has been convicted of an offence under Part II of the Act of 1933.

Where the Board intend to vary the conditions of a licence they must give at least two months' notice before the expiry of the existing licence; and a licence may only be revoked upon a breach of the conditions by the licence-holder or in the event of the premises no longer being used for the production of bacon. Moreover, there are safeguards, in the form of arbitration provisions, to ensure that licences are not unjustly revoked.

The Position of New Entrants.—A licence may not be refused to any applicant except on certain specific grounds. These are (a) that the curing establishment is redundant having regard to the existing and prospective consumption and sources of supply of bacon; (b) that the premises concerned are unsuitably situated in relation to pig supplies or consuming areas; (c) that the premises are not suitably equipped for efficient production of bacon; (d) that a previous licence has been revoked or the holder has been convicted of an offence under Part II of the Act. Any person producing or desirous of producing bacon in Great Britain who is aggrieved by the refusal of the Board to grant him a licence, may refer the question to arbitration.

The Position as regards Existing Factories.—During a period of two years from the date on which the scheme comes into force the position of existing curers is safeguarded by a provision to the effect that a licence cannot be refused in respect of any premises in which bacon was being produced at any time during the six months preceding May 17, 1935. After that period, existing curers will be on the same footing as other curers. During the protective period a licence can, of course, be revoked for breach of conditions or on conviction for an offence under Part II of the Act or if the premises are no longer used for bacon production.

The Position of the Pigs Marketing Board.—The Pigs Marketing Scheme confers on the Pigs Board the right to manufacture bacon from "surplus" pigs, that is to say,

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pigs which bacon curers refuse or are unable to take on the contract terms prescribed by the Pigs Board. The Development Scheme accordingly provides that a licence shall not be refused to the Pigs Marketing Board for the production of bacon from surplus pigs, in any premises occupied by them, except upon the grounds of unsuitable situation, inefficient equipment, or revocation of a previous licence in respect of those premises. Moreover, since it may happen that the number of surplus pigs which the Pigs Board may be permitted to turn into bacon is not sufficient to warrant the occupation by the Board itself of a factory, the scheme further provides that the Development Board may grant to the Pigs Board occasional licences, authorizing the production of bacon from surplus pigs in premises other than those occupied by the Board.

Permissive Powers : *Purchase of Redundant Factories.*

—As a further measure aimed at “preventing, eliminating or reducing inefficient or excessive production,” the Development Board may purchase bacon factories and dispose of them as it thinks fit, subject to there being in force resolutions of the constituent Marketing Boards to the effect that it is expedient for the Development Board to exercise this power.

Education and Research.—The Development Board may also promote or conduct education and research in connexion with the production and marketing of bacon or pigs: it could for example set up litter-testing stations, or it could make grants towards research into pig diseases such as swine fever and erysipelas. In this field there is highly important work which the Development Board can carry out for the betterment of the pig industry.

Transfer of Powers of Constituent Marketing Boards.—The Pigs and Bacon Marketing Boards have extensive powers with regard to the marketing of pigs and bacon, the exercise of which in the interests of the industry as a whole is a matter of equal concern to producers and curers. It was considered desirable by the Lane-Fox Commission that, without usurping the autonomy of the marketing boards, a properly representative body should be constituted to settle considerations of common policy.

The scheme, therefore, provides for the delegation by the Pigs and Bacon Boards to the Development Board, if they so desire, of certain of their powers. No such delegation of

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authority, however, can take place without a specific resolution of the Board concerned and the powers so delegated may be withdrawn at any time. Moreover, in the case of a transfer of Pigs Marketing Board powers, the interests of producers are still further protected by a provision enabling producers at an Annual General Meeting, during the first three years of the Development Scheme, to demand a referendum on the question whether such powers shall remain transferred to the Development Board or be withdrawn.

The Pigs Board may delegate to the Development Board the power to determine the terms of sale of pigs to curers and the descriptions of pigs which may be sold, the method of insurance of pigs, and the confirmation of bacon pig contracts. The Bacon Board may also delegate the power to prescribe grades for bacon, to regulate the quantity of bacon which may be sold by registered curers and to advertise bacon.

These powers are the essence of the two marketing schemes, and their transfer to the Development Board would do much to ensure smooth working. The advice and help of the appointed members (who, if necessary, may have to decide the issues) should overcome many of the difficulties which at present exist in the settlement of prices and contract terms for the sale of pigs.

The scheme also provides that any additional powers which may be conferred upon the Boards may be transferred to the Development Board in a similar manner.

Finance.—The Development Board will be financed by equal contributions from the marketing boards of an amount not exceeding 4*d.* from each board for each pig delivered under contract. The contributions, however, must not exceed 1*d.* per pig in 1935 or 2*d.* per pig in any other year unless authorized by resolution of the marketing boards. On the basis of 2 million pigs per annum the maximum annual revenue of the Development Board would thus be about £65,000. The maximum contributions payable by registered producers under the related marketing schemes have not been increased.

The Development Board may also borrow money for the purpose of exercising any of their functions under the scheme.

MARKETING NOTES

Milk Marketing Scheme: Result of the Poll.—The Agricultural Marketing Acts provide that if, on a poll of registered producers on the question of the revocation of an agricultural marketing scheme, those voting in favour of revocation (a) number more than half the total number of registered producers voting, and (b) are capable of producing more than half the quantity of the regulated product that all the registered producers are capable of producing, then the scheme shall be revoked. The result of the Poll on the Milk Marketing Scheme, which was announced on August 19, shows, however, a substantial majority against revocation of the Scheme. The voting was as follows:—

Against Revocation:

79,711 producers (81 per cent.) having
in their possession at noon on
August 1, 1935 1,431,342 cows (86½ per cent.)

In favour of revocation:

18,747 producers (19 per cent.) having
in their possession at noon on
August 1, 1935 222,722 cows (13½ per cent.)

98,458

1,654,064

Pool Prices for July, 1935.—The wholesale “liquid” price for July, 1935, was 1s. 1d. per gallon in all regions, 1d. per gallon more than in June. Pool prices and rates of producer-retailers’ contributions for July are given below, with comparative figures for June and also for July, 1934, when the regional liquid price was 1s. 1d. per gallon in the south-eastern region and 1s. per gallon in all other regions:—

<i>Region</i>	<i>Pool Prices</i> (d. per gal.)			<i>Producer-Retailers’</i> <i>Contributions</i> (d. per gal.)		
	July 1935	June 1935	July 1934	July 1935	June 1935	July 1934
Northern ..	10	9½	10½	2½	2½	1½
North-Western ..	9½	9½	10½	2½	2½	1½
Eastern ..	10½	10	10½	2½	1½	1½
East Midland ..	10	9½	10½	2½	2½	1½
West Midland ..	9½	9½	10½	3	2½	1½
North Wales ..	9½	9½	10½	3	2½	1½
South Wales ..	10	9½	10½	2½	2½	1½
Southern ..	10½	10	10½	2½	1½	1½
Mid-Western ..	9½	9½	10½	3	2½	1½
Far-Western ..	9½	9½	10½	3	2½	1½
South-Eastern ..	10½	10½	11½	2½	1½	1½
Unweighted Average	9.89	9.57	10.52	2.71	2.14	1.43

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Producer-retailers who qualified were credited with level delivery premiums at the rate of $\frac{1}{2}d.$ per gallon. Accredited producers, numbering 7,699 on July 1, received a premium of $1d.$ per gallon in addition to the pool price. A levy of $\frac{1}{4}d.$ per gallon was made for general expenses.

Sales on wholesale contracts were as follows:—

	<i>July, 1935</i> <i>(estimated)</i>	<i>July, 1934</i>
	<i>gal.</i>	<i>gal.</i>
Liquid	46,832,962	45,507,597
Manufacturing	34,029,557	19,371,953
Total	80,862,519	64,879,550
Percentage Liquid Sales ..	59.9	70.1
„ Manufacturing Sales ..	42.1	29.9

The average realization price of manufacturing milk during July was $5.38d.$ per gallon, compared with $5.13d.$ per gallon for June. Milk manufactured into cheese by farmhouse cheesemakers amounted to 2,149,413 gallons, compared with 2,250,631 gallons in June, and 3,447,646 gallons in July, 1934.

Pigs and Bacon Marketing Schemes.—*Pig Prices for August.*—Contract prices for bacon pigs showed a decline of $5d.$ per score in August, the price for a basic pig (i.e., Class I, Grade C) being $11s. 4d.$ per score, compared with $11s. 9d.$ for July. A further slight fall occurred in the price of the standard feeding stuffs ration, whilst the ascertained bacon price also fell from $95s. 5d.$ to $92s. 4d.$ per cwt. The basic price is exclusive of the curers' contributions of $1d.$ per score towards insurance and $2d.$ per score towards level delivery bonuses on pigs delivered during the first four months of the year.

Amendment of the Bacon Marketing Scheme.—Two amendments of the Bacon Marketing Scheme, submitted by the Bacon Marketing Board on March 12, 1934, which were the subject of a Public Inquiry in July, 1934, were approved by the House of the Commons on July 26, 1935, and by the House of Lords on August 1, 1935. The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have accordingly made an Order entitled "The Bacon Marketing Scheme (Amendment) Order, 1935,"* approving the amendments and bringing them into force as from August 3, 1935.

* S.R. & O. 1935, No. 791. Obtainable from H.M. Stationery Office at the addresses given on the cover of this JOURNAL, price $1d.$, post free $1\frac{1}{2}d.$

MARKETING NOTES

The first amendment provides that, in the event of an Order being made by the appropriate Minister under Section 2 of the Agricultural Marketing Act, 1933, regulating the quantity of bacon produced in Great Britain that may be sold, curers who produce bacon from pigs they rear themselves should share *pro rata* with other pig producers in any increase or decrease in the home production of pigs for bacon.

The other amendment is largely of a drafting nature. The Bacon Marketing Scheme was approved before the Agricultural Marketing Act, 1933, was passed. In anticipation of the passing of that Act, para. 38 (b) of the Scheme gave the Board power to determine "if and when authorized by Act of Parliament and subject to the provisions thereof" the quantity of bacon which might be sold by any registered producer. The Act of 1933 authorized a scheme to provide for the determination of quantity, but it required that a scheme, when giving a board power to determine quantity, should contain a provision (a) setting out what the method of determination should be, or (b) that the Board should prescribe the method. Neither of these alternatives was contained in the Bacon Marketing Scheme. The amendment adopts the second alternative and brings the scheme into line with the Act.

Potato Marketing Scheme.—*Standard of Dressing for Ware Potatoes.*—The Potato Marketing Board have invited registered producers to adopt the following standard dressings for ware potatoes:—

1. *General Conditions.*—Potatoes must be reasonably clean, free from soil, healthy and suitable for human consumption. Cracked or misshapen potatoes must be excluded.

2. *Size.*—The minimum size for single tubers is determined by the Board's minimum riddle regulations for the time being in force.

3. *Tolerances.*

(a) *Size.*—The weight of potatoes per cwt. which may pass through a riddle having a square mesh, as specified by order of the Board, or as defined in paragraph 67 of the Scheme, or such riddle above the specified minimum riddle as may be prescribed in any contract between buyer and seller, shall be as follows:—

<i>Minimum riddle prescribed</i>		<i>Allowance</i>		<i>No potatoes must pass through</i>
1½ in.	..	3 lb.	..	1½-in. riddle
1½ in.	..	3 lb.	..	1½-in. riddle
1½ in.	..	4 lb.	..	1½-in. riddle
1½ in.	..	5 lb.	..	1½-in. riddle
2 in. (or above)		6 lb.	..	1½-in. riddle

(b) *Waste.*—The maximum allowance per cwt. for appreciably diseased, damaged, cut, cracked or greened potatoes is six pounds.

(c) *Variety, etc.*—At least 95 per cent. by count of the potatoes must conform to specification as regards variety and type of soil.

MARKETING NOTES

Riddle Regulations.—By a resolution of the Potato Marketing Board passed on August 23, 1935, registered producers are prohibited until further notice from selling, for human consumption, any potatoes which are capable of passing through a riddle of $1\frac{1}{8}$ in. mesh. This order supersedes the one made on August 1 prescribing a $1\frac{1}{4}$ in. minimum riddle.

Regulation of Supplies of Maincrop Potatoes in the 1934-35 Season.—The system of supply regulation introduced under the Agricultural Marketing Acts, 1931-33, with the object of stabilizing the potato market, was described in the December, 1934, issue of this JOURNAL (pp. 894-7).

Supplies.—The following table shows for each of the past five seasons the estimated total production of potatoes in Great Britain and the net maincrop supplies available for home consumption, after deducting first earlies, exports and seed, and adding imports into the United Kingdom and shipments to Great Britain from Northern Ireland:—

		<i>Total Production (ooo tons)</i>		<i>Net Maincrop Supplies (ooo tons)</i>
1930-31	..	3,603	..	3,179
1931-32	..	3,154	..	3,269
1932-33	..	4,450	..	3,736
1933-34	..	4,555	..	3,749
1934-35	..	4,464	..	3,715

Supplies of maincrop potatoes in Great Britain in the 1934-35 season were approximately equal to those in each of the two previous years, and about half a million tons higher than in 1930-31 and 1931-32. It is believed, however, that the proportion of sound ware potatoes was higher in 1934-35 than in the two previous years.

Control of Home Supplies.—In view of the size of the 1934 crop and the dullness of the market, the Potato Marketing Board from time to time, during the 1934-35 season, exercised its powers of control over supplies marketed. As from December 6, 1934, the Board prescribed that all potatoes sold for human consumption must pass over a minimum riddle of $1\frac{5}{8}$ in. for King Edwards and similar types and $1\frac{7}{8}$ in. or $1\frac{3}{4}$ in. for other varieties. During the whole of February, 1935, the minimum size of King Edwards was increased to $1\frac{3}{4}$ in. in Scotland and the Fen Districts. On March 7, after a census of stocks had shown that, in spite of these measures, a considerable surplus was in prospect, the size of the minimum riddle was again increased. The minimum of $1\frac{3}{4}$ in. for King Edwards and

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similar types was applied to the whole country and for other varieties the minimum was increased to 2 in. Severe frosts in May, however, inflicted considerable damage on the early crop, and gave rise to a greatly increased demand for main-crop potatoes. In consequence, the Board found it necessary to relax the riddle regulations to $1\frac{1}{2}$ in. for King Edwards and $1\frac{5}{8}$ in. for white varieties, and, subsequently, producers found little difficulty in disposing of the remainder of their stocks.

Control of Imports.—As described in the above-mentioned note, the Potato (Import Regulation) Order, and the administrative arrangements made thereunder, were designed to enable imports to be regulated from time to time according to the available supplies of home-grown potatoes and the demand of the market. In consequence of the size of the 1934 crop, import requirements were small. Before the Order came into force on November 8, 1934, imports from foreign countries and the Irish Free State had been limited by voluntary agreement. It had been arranged that imports in the two months, September and October, 1934, would not exceed 4,060 tons, i.e., the quantity imported in the corresponding months of 1934. Actual imports from the beginning of September to the first week in November amounted to rather more than 2,000 tons. Global quotas for maincrop potatoes were subsequently fixed from time to time in the light of recommendations made by the Market Supply Committee after consultation with the Potato Supplies Consultative Committee. Actual imports during the period from the second week of November, 1934, to the end of June, 1935, totalled less than 6,500 tons.

Shown below are the imports of maincrop potatoes into the United Kingdom each month during the 1934-35 season, compared with the two previous seasons. Although the

		1932-33	1933-34	1934-35
		Tons	Tons	Tons
September	..	5,200	1,000	200
October	..	4,900	2,600	1,700
November	..	6,900	3,600	700
December	..	3,500	2,700	500
January	..	4,200	2,400	1,500
February	..	3,200	1,300	500
March	..	3,400	1,200	1,100
April	..	4,100	700	400
May	..	7,300	900	500
June	..	1,600	500	1,400
		44,300	16,900	8,500

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scope of the Order extends to the United Kingdom, imports consist almost entirely of landings in Great Britain.

Imports in the ten months thus represented only 50 per cent. of the quantities imported in 1933-34, 20 per cent. of the 1932-33 imports and only a fraction of 1 per cent. of total market requirements.

Shipments from Northern Ireland into Great Britain were also rather smaller than in previous years. Up to the end of June, they totalled 112,000 tons compared with 114,200 tons and 145,300 tons respectively in the 1933-34 and 1932-33 seasons.

Prices.—Having regard to the size of the 1934-35 crop, prices might have been expected to follow fairly closely those ruling during the two previous seasons. This, however, was not the case. The following table shows the average monthly wholesale price of potatoes,* in 7 of the principal markets in England and Wales during the past three seasons, together with the average for the whole season. The wholesale price index, with prices in the years 1911-13 as a base, is also given for each month.

Month	1932-33		1933-34		1934-35	
	Per ton	Index	Per ton	Index	Per ton	Index
	<i>s. d.</i>		<i>s. d.</i>		<i>s. d.</i>	
September ...	84 0	114	73 6	99	117 0	158
October ...	86 6	120	79 6	110	109 0	151
November ...	87 0	123	82 0	115	103 6	146
December ...	85 6	120	80 0	112	95 0	133
January ...	89 0	116	79 6	104	92 6	121
February ...	87 0	113	77 0	100	89 6	116
March ...	83 0	106	76 0	97	85 0	108
April ...	79 6	87	81 0	89	86 0	95
May ...	87 0	97	80 6	90	101 6	113
	85 5	111	78 9	102	97 8	127

The average price in the 1934-35 season was 12s. 3d. per ton above 1932-33 and 18s. 11d. per ton above 1933-34.

Prices were considerably higher at the beginning of the 1934-35 season than in the later months. This seems to have been the result of slower marketings in the early months owing to lack of knowledge of the size of the crop. Prices

* Average of 1st and 2nd qualities, Arran Chief and King Edward.

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reached their lowest level during the months March and April, and it is most probable that they would have fallen substantially lower but for the Potato Marketing Board's riddle regulations which were most stringent at that period. At the end of the season—in May—there was a marked rise in price which was accentuated by the influence of severe late frosts on the new season's crop.

The wholesale price index in the months September-December, 1934, averaged 147 compared with 109 and 119 in the same months of 1933 and 1932 respectively. In view of the similarity in total supplies during the three seasons, it might have been expected that prices during the remainder of the 1934-35 season would have been proportionately below those of the two previous years. In fact, however, the wholesale price index for the months January to May, 1935, remained a little above that of the two previous years; the index was 111 compared with 96 in 1934 and 104 in 1933.

Retail prices during the past season reflected to some extent the higher wholesale prices. The averages of the monthly retail indices from September-May in the three seasons 1932-33, 1933-34, and 1934-35 were 113, 108 and 124 respectively.

Regulation of Imports of Meat: (a) *From Empire Sources.*—The Minister of Agriculture and Fisheries announced in the House of Commons on July 15 that an agreement had been reached with the Governments of the two principal meat-exporting Dominions, namely Australia and New Zealand, in regard to their supplies to the United Kingdom market of frozen mutton and lamb in the last six months of 1935 and in the year 1936, and of beef and veal in the last six months of 1935. Subsequently arrangements were made in regard to supplies of frozen pork from Australia and New Zealand, and of chilled and frozen meat from other Empire sources. The full programme for the six months, July-December, 1935, and for the year 1935 as a whole, is given in the table overleaf.

Notes.—(1) Imports of frozen beef may be increased at the expense of chilled beef.

(2) Provision made in certain cases for the "carry-over," if required, of a limited quantity from one period to the next.

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(3) Frozen pork figures for Australia and New Zealand are exclusive of pork for curing in this country, which is dealt with separately under the arrangements for the regulation of bacon supplies.

July-December, 1935.

	(000 cwt.)					
	<i>Beef and Veal</i>			<i>Frozen Mutton & Lamb</i>	<i>Frozen Pork</i>	<i>Total</i>
	<i>Chilled</i>	<i>Frozen</i>	<i>Total</i>			
Australia ..	160.0	990.0	1,150.0	950.0	28.7	2,128.7
New Zealand	66.0	412.0	478.0	1,578.0	140.3	2,196.3
Canada ..			108.4	0.2	14.3	122.9
Union of South Africa	30.0	4.0	34.0	—	—	34.0
Southern Rhodesia			91.0	—	—	91.0
Bechuanaland	—	15.0	15.0	—	—	15.0

Year 1935.

	(000 cwt.)					
	<i>Beef and Veal</i>			<i>Frozen Mutton & Lamb</i>	<i>Frozen Pork</i>	<i>Total</i>
	<i>Chilled</i>	<i>Frozen</i>	<i>Total</i>			
Australia ..	246.0	1,421.2	1,667.2	1,850.6	60.9	3,578.7
New Zealand	142.0	781.2	923.2	3,666.8	275.3	4,865.3
Canada ..			132.2	0.2	27.1	159.5
Union of South Africa	60.0	9.5	69.5	—	—	69.5
Southern Rhodesia			187.0	—	—	187.0
Bechuanaland	—	30.0	30.0	—	—	30.0

(4) Imports of beef and veal from Canada in the six months, July-December, 1935, may be rather larger, and of frozen pork rather smaller, than the figures shown.

It is estimated that arrivals of beef and veal from Australia and New Zealand in the fourth quarter of the year will be 100,000 cwt. less than the quantity which arrived in the corresponding quarter of 1934, and that over the year as a whole they will be approximately 120,000 cwt. less than in 1934. As regards mutton and lamb, the effect of the programme is to maintain total supplies approximately at the 1934 level.

The agreement with Australia and New Zealand in regard to supplies of mutton and lamb in 1936 provides for a total of 1,750,000 cwt. from Australia, and 3,900,000 cwt. from New Zealand, subject to adjustment upwards or downwards in the light of later estimates of United Kingdom production and the capacity of the market. The intention is to maintain total United Kingdom supplies approximately at the 1934 level.

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(b) *From Foreign Countries.*—Imports of meat from foreign countries are being regulated for the time being on the same quantitative basis as in the first two quarters of 1935, namely: CHILLED BEEF, approximately 90 per cent. of the quantities imported in the Ottawa year, July, 1931-June, 1932; FROZEN BEEF (CARCASS AND BONED BEEF) AND VEAL, AND FROZEN MUTTON AND LAMB, 65 per cent. of the quantities imported in the Ottawa year; FROZEN PORK, the average of imports in the three years 1932, 1933 and 1934.

Regulation of Imports of Processed Milks.—Information as to the arrangements made for the regulation of imports of processed milks from foreign countries and the Irish Free State during the first nine months of 1935 appeared in the June, 1935, issue of this JOURNAL (pp. 272-273).

The following table shows the quantities of condensed whole milk (sweetened and unsweetened), condensed skimmed milk, milk powder and cream imported from Empire and foreign sources, respectively, during the first six months of 1933, 1934 and 1935:—

	Condensed whole milk (sweetened and unsweetened)	Condensed skimmed milk (sweetened)	Milk powder (unsweetened)	Cream
Jan.—June, 1933	Cwt.	Cwt.	Cwt.	Cwt.
Empire	88,935	37,799	96,155	16,343
Foreign	198,807	1,032,838	45,275	38,096
Total	287,742	1,070,637	141,430	54,439
Jan.—June, 1934				
Empire	49,940	27,829	109,416	13,147
Foreign	168,629	822,821	37,824	24,869
Total	218,569	850,650	147,240	38,016
Jan.—June, 1935				
Empire	75,404	30,184	96,147	10,739
Foreign	121,891	678,930	26,355	20,049
Total	197,295	709,114	122,502	30,788

Total imports from foreign countries in January-June, 1935, were 19½ per cent. less than in the corresponding period of 1934, and 35½ per cent. less than in that of 1933. Imports from all sources were 15½ per cent. less than in the first six months of 1934, and nearly 32 per cent. less than in the first six months of 1933.

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Milk Act, 1934.—Advances amounting to £1,232,055 have to date been made to the Milk Marketing Board under Section I of this Act in respect of milk used for manufacture (excluding milk manufactured by the Board itself or milk used for cheesemaking on farms). Particulars are given below:—

Period	Gallons	*Rate of advance per gallon	Advances
April to Sept., 1934 ...	79,304,860	Varying from 0·25 to 1·5 pence	£ 426,214
Oct., 1934, to Mar., 1935	73,506,544	Varying from 1·0 to 2·28 pence	571,119
April to June, 1935 ...	69,707,287	Varying from 0·5 to 0·96 pence	234,722
Total	222,518,691	—	1,232,055

* Varies according to month and product.

Under Section 6 of the Act, a sum of £186,608 has by direction of the Treasury, been paid to date by the Ministry to the Government of Northern Ireland with the object of securing a standard price for milk manufactured into cream and butter at registered premises in Northern Ireland. This sum is made up as follows:—

Period	Gallons	†Rate of Payment	Amount of Equalization Payment
April to Sept., 1934 ...	12,147,258	Varying from 1·3 to 2·2 pence	£ 101,327
Oct., 1934, to Mar., 1935	6,047,834	Varying from 1·88 to 2·99 pence	62,063
April and May, 1935...	3,331,274	Varying from 1·32 to 1·82 pence	23,218
Total	21,526,366	—	186,608

† Varies according to month.

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 3·79 pence per pound for the month of August.

Milk-in-Schools Scheme.—Payments amounting to £344,254 have been made to date to the Milk Marketing Board under Section II of the Milk Act by way of com-

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pensation in respect of the Board's expenses in supplying milk to school children at reduced rates. Details are given below :—

Month	Gallons	‡ Rate of Compensation per Gallon	Exchequer
1934		<i>d.</i>	<i>£</i>
October	1,967,981	5	41,000
November	2,448,750	5	51,016
December	1,767,930	5½	40,515
1935			
January	2,168,230	5½	49,688
February	2,341,130	5½	53,651
March	2,377,500	5	49,531
April	1,623,407	5	33,821
May	2,002,558	3	25,032
Total	16,697,486	—	344,254

‡ One-half of the Board's loss, which is the wholesale price, plus 6*d.* distribution costs, minus 1*s.* paid by children.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by August 8 to £3,326,820. These payments were in respect of 1,395,659 animals, the average payment per beast being £2 7*s.* 8*d.* Since August 6, 1934, some 395,000 animals have been marked at ports (excluding Northern Ireland) under the Marking of Imported Cattle Order.

Extension of Subsidy Period.—The Cattle Industry (Emergency Provisions) (No. 2) Act, 1935, received the Royal Assent on August 2. As indicated in the last issue of this JOURNAL, it extends the subsidy period to the end of June, 1936, and makes provision for a further extension not exceeding four months, subject to the specific authority of Parliament.

Wheat Act, 1932 : Sales of Home-Grown Wheat—Cereal Year 1934-35.—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1934, to August 2, 1935, cover sales of 35,750,663 cwt. of millable wheat, as compared with 29,430,269 cwt. in the corresponding period (to August 3) in the last cereal year.

Wheat Deficiency Payments—Cereal Year 1934-35.—The Wheat Commission have paid a fourth advance to registered growers on wheat certificates delivered to the Commission

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up to June 28, 1935. The total covered by the four advances amounts to £5,129,181 as compared with £4,109,274 in the last cereal year. The final payment to all registered growers who have delivered valid wheat certificates to the Commission during the cereal year ended July 31, 1935, will probably be made about the middle of September.

Purchase of Stocks of Home-Grown Wheat.—The Wheat Commission have resolved that no representation be made to the Minister under Section 1 (3) of the Wheat Act, 1932, that it is expedient that any stocks of home-grown millable wheat be bought by the Flour Millers' Corporation during the cereal year 1934-35.

Beet Sugar Industry: Results of the 1934-35 Campaign in Great Britain.—A comparative statement is given below of the results of the beet sugar manufacturing campaigns, 1933-34 and 1934-35. The beet area and all figures of production, both in field and factory, were the highest ever recorded in this country.

	1934-5	1933-4
Acreage under sugar-beet	403,884	305,774
Tonnage of beet delivered to factories ..	4,094,707	3,298,119
Average yield of beet per acre (tons) ..	10.1	9.0
Average sugar content of beet (per cent.)..	17.1	16.4
Average farm output of sucrose per acre of beet (lb.)	3,888	3,312
Average price paid per ton of beet delivered to factories	40s. 9d.	39s. 7d.
Total sum, including cost of transport, paid by factories to growers.. .. .	£8,343,000	£6,528,000
Number of beet growers	46,054	39,828
Average acreage per grower	8.8	9.2
Number of factories	18	18
Average number of days worked at factories	122	107
Average number of workers employed in the factories	9,600	9,000
Production of sugar (tons)	*614,800	463,038
Average extraction of sugar expressed as a percentage of beets delivered to factories	15.0	14.0
Average extraction of sugar expressed as a percentage of the total sucrose in the beets	88	86
Average factory output of manufactured sugar per acre of beet (lb.)	3,410	2,836
Production of by-products:—		
Molasses (tons)	*150,000	128,380
Pulp:—Dry (tons)	313,462	244,490
Wet (tons)	143,327	77,284
Subsidy paid:—		
Sugar	*£3,995,000	£3,007,942
Molasses	*£450,000	£380,750
Total	*£4,445,000	£3,388,692

* Provisional.

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British Sugar (Subsidy) Bill, 1935.—This Bill, which extends, with certain modifications, State assistance to the sugar-beet industry for a further period until August 31, 1936, received the Royal Assent on August 2, 1935.

Future of the Sugar-beet Industry.—The proposals of H.M. Government in regard to future sugar policy were announced by the Minister of Agriculture and Fisheries in the House of Commons on July 30. The conclusions reached by the Government and the financial and administrative arrangements which will be necessary to give effect to them are given in detail in a White Paper (Cmd. No. 4964) which is reproduced on pages 533-541 of this issue.

National Mark Apples.—In the light of the six years' experience gained in the operation of the National Mark Scheme for home-produced dessert and culinary apples, revised definitions of grades for home-grown apples have recently been introduced. The revised grades and grade definitions had previously been submitted to the National Farmers' Union and to the National Mark Fruit Trade Committee, both of which bodies had recommended their adoption for an experimental period of one year.

A new statutory grade has been defined, to be known as the *Super* grade, in which only apples entirely free from blemish may be included. The *Extra Fancy* grade designation has been modified to the extent that it will cover the small tolerance hitherto permitted for this grade; while the new *Fancy* grade definition is slightly more restricted than the old.

An analysis has been made and definitions drawn of the different types of russetting, and the area of russetting permitted in each of the grades has been prescribed.

The revision of the statutory grades has been followed by a revision of the requirements of the National Mark Scheme. It has been decided now to restrict the scheme to the three grades, *Super*, *Extra Fancy* and *Fancy*. Apples of the *Domestic* grade must not be packed under the National Mark. *Super* grade apples will be packed only in trays, and *Extra Fancy* in boxes, half boxes and quarter boxes. For *Fancy* grade apples, certain returnable packages will still be allowed.

Full details of the revised statutory regulations and requirements of the National Mark Scheme are contained in

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revised Marketing Leaflet No. 59, copies of which may be had gratis and post free from the Ministry at No. 10, Whitehall Place, London, S.W.1.

National Mark Plums.—On the recommendation of the National Mark Fruit Trade Committee, additions have been made to the list of varieties of plums approved for packing under the National Mark. A complete list of the varieties for which statutory definitions of quality have been prescribed are contained in revised Marketing Leaflet No. 59.

National Mark Cheshire Cheese Scheme.—Particulars as to farm- and creamery-made Cheshire cheese graded under the National Mark Scheme for the quarter ended June 30, 1935, are as follows:—

I. *Farm-made Cheese.*

No. of makers offering cheese for grading	117
Total No. of cheese submitted for grading	21,378
Graded "Selected"	19,949
Rejected	1,429

II. *Creamery-made Cheese.*

No. of makers offering cheese for grading	11
Particulars of cheese submitted for	<i>No. Weight.</i>
grading	<i>cwt.</i>
grading	28,090 11,413
Graded "Selected"	27,218 11,023
Rejected	872 390

National Mark Stilton Cheese Scheme.—Particulars of Stilton cheese graded under the National Mark Scheme for the quarter ended June 30, 1935 (compiled from returns rendered by authorized makers), are as follows:—

No. of makers grading cheese under the		
scheme	10	
	<i>No. Weight.</i>	
	<i>cwt.</i>	
Total cheese graded	4,899	735
(a) Blue Veined "Extra		
Selected"	546	70
(b) " " "Selected"	1,179	152
(c) White	3,174	513

Proposed National Mark Schemes for Caerphilly and Cheddar Cheese.—Under the auspices of the National

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Association of Creamery Proprietors and Retail Dairymen, a meeting of West Country creamery makers of Cheddar cheese was held on July 29, 1935, at Sherborne, Dorset, to discuss details of a draft proposed National Mark Scheme for grading and marking of home-produced creamery-made Cheddar cheese. A feature of the draft Cheddar cheese scheme, copies of which can be obtained from the Ministry, is that the grading shall be undertaken by independent graders remunerated by the industry from grading fees. The meeting unanimously passed a resolution in favour of the proposed scheme, and certain details of administration are being examined with a view to the early introduction of the scheme.

The proposed standard grades for Cheddar cheese and also for Caerphilly cheese have been promulgated in draft form in the Agricultural Produce (Grading and Marking) (Cheddar Cheese) Regulations, 1935, and the Agricultural Produce (Grading and Marking) (Caerphilly Cheese) Regulations, 1935. Copies are obtainable from H.M. Stationery Office or through any bookseller.

National Mark Eggs: (a) *Increase in Output.*—The total output for the National Mark Egg Packing Stations for the three months, April to June, 1935, was 172.4 million eggs, of which 143.4 million were packed under the National Mark as compared with 154.8 million and 126.1 million respectively, for the corresponding period of 1934. The following table shows the aggregate monthly output of the stations during these periods:—

Month	1934			1935		
	Total out- put of Packing Stations (fresh eggs)	Output under National Mark	Percentage of total output under National Mark	Total out- put of Packing Stations (fresh eggs)	Output under National Mark	Percentage of total output under National Mark
April ...	53.2	42.1	79	63.9	52.9	83
May ...	56.6	46.8	83	61.9	51.2	83
June ...	45.0	37.2	83	46.6	39.3	84
Totals for 3 m'th	154.8	126.1	81	172.4	143.4	83

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(a) *Quality Control and Publicity: List of Approved Retail Distributors of National Mark Products.*—With the co-operation of the National Federation of Grocers' and Provision Dealers' Association Ltd., a list of approved retail distributors of National Mark products, principally eggs, is being compiled. The conditions of admission to the list are as follows:—

- (i) that an applicant is prepared to display for sale National Mark eggs, and/or other National Mark commodities as may be appropriate to his trade;
- (ii) that he will permit the Ministry to publish his name and address, and the National Mark produce which he regularly sells;
- (iii) that he will co-operate with duly authorized officers of the Ministry in maintaining the quality standards of National Mark produce, and will communicate to the Ministry complaints received by him as to the quality of National Mark produce;
- (iv) that he will inform the Ministry of all cases in which National Mark eggs are received by him in sealed containers bearing a code date indicating that the case has been packed for more than ten days.

Each approved applicant will receive a Certificate of Appointment as an approved retail distributor of National Mark products. He will be furnished from time to time with code date-mark calendars and publicity material for use with National Mark products.

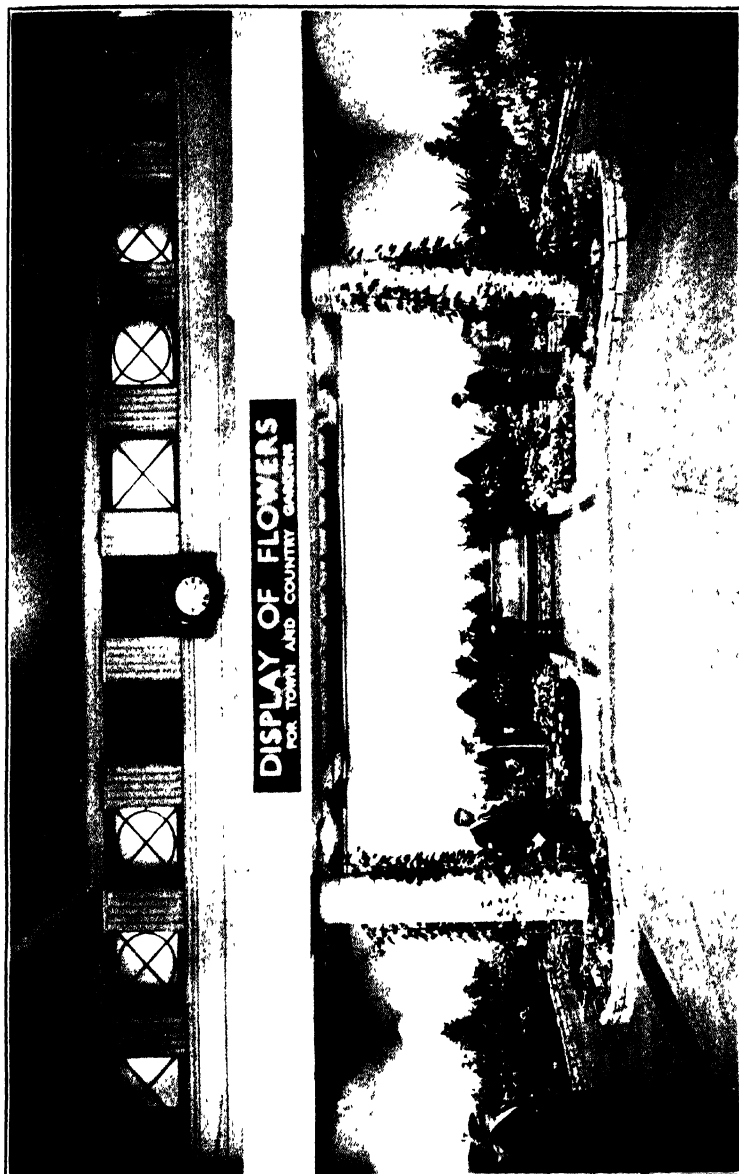
Applications and inquiries in connection with the scheme are already being received from Grocers' Associations and retailers throughout the country.

National Mark Creamery Butter.—The following firms, additional to those reported in the issue of this JOURNAL for May last, have been enrolled in the National Mark Scheme for Creamery Butter:—

Co-operative Wholesale Society, Ltd., 99, Leman Street, London, E.1 (creamery at Stowmarket).
Nottingham Co-operative Society, Ltd., Nottingham.
West Somerset Dairy & Bacon Co., Ltd., Taunton.
Dried Milk Products, Ltd., Wincanton.
The Somerset Dairies (F. Lawrence), Fishponds, Bristol.
Waldens Mid-Wilts. Creameries, Ltd., Trowbridge (re-packers only)

Twelve firms are now authorized to apply the National Mark to creamery butter made from home-produced milk.

Demonstrations at Shows and Exhibitions.—During September the Ministry will stage an exhibit at the Altrincham Agricultural Show on the 18th. Exhibits of National Mark Produce will be shown at the Rochdale Trades Exhibition from September 11 to 21, and at the



Courtesy Photo L P T B

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for advice were made by recent purchasers of houses who were on the point of laying out new gardens.

Canada: Further Marketing Schemes.—Two further schemes, one dealing with cheese, and one with preserved strawberries, have recently been approved under the Natural Products Marketing Act, 1934, while a new tree-fruit scheme has been substituted for the original British Columbia Tree Fruit Scheme. The principal features of these schemes are:—

Ontario Cheese Patrons' Marketing Scheme.—This scheme, which became effective on June 25, 1935, provides for the regulation by a Local Board of the marketing of all cheddar cheese produced within the province. A poll is to be conducted before March 31, 1936, to determine the wishes of registered producers as to the continuation or termination of the scheme, or as to any additions or amendments thereto. A provisional board is to hold office until December 31, 1935.

The scheme empowers the Board to register all persons engaged in the production, and to license all those engaged in the marketing, of the regulated product. The Board may designate the agencies through which, and the manner in which, the regulated product is to be marketed. A marketing levy, not exceeding five cents per hundred pounds of cheese, may be imposed to provide a fund for the expenses of organization. A pool may be conducted for the equalization of returns in connexion with any experimental shipment made with the consent of the owners.

Processed Berry Marketing Scheme.—A scheme to regulate the marketing of strawberries grown in Canada and preserved in a solution of sulphur dioxide was approved on June 29, 1935. Power of regulation throughout Canada is vested in the Processed Berry Marketing Board, consisting of three members. The Board is empowered to determine the manner and channels of distribution and the quantity and grade of the regulated product that may be marketed by any person at any time. Compensation may be paid for any loss sustained by withholding fruit from, or forwarding fruit to, a specified market, pursuant to an order of the Board. The Board may define the process of preservation to be adopted, and may call for full information and returns from all persons engaged in the production and marketing of the regulated product, and may inspect the books and premises of such persons. It may co-operate or act with any local board that is regulating the marketing of strawberries in any part of Canada.

British Columbia Tree Fruit Scheme (Amended).—The original British Columbia Tree Fruit Scheme (see this JOURNAL for February, 1935, page 1100) has now been amended to meet the requests of the British Columbia Tree Fruit Board, the Dominion Board having reported that the suggested amendments meet with the approval of the majority of the growers and shippers.

The original scheme provided that all registered growers were entitled to vote, but this right is now reserved to registered growers owning or operating an orchard of one acre or more fully planted with fruit trees. The amended scheme gives the Local Board power to determine by whom all charges and tolls shall be paid, whereas the original scheme specified that charges were payable by the shippers marketing the product. Provision is made for the raising of the maximum charge or toll of \$0.02 per box of apples (or proportionate rates for other products) if the consent of the British Columbia Fruit Growers' Association is first obtained, and the Local Board is given greater freedom in the conduct of pools for the equalization of returns from the sale of the regulated product and for the distribution of the proceeds.

Measures to Improve French Meat Market.*—In the course of his report to the President of the French Republic on the new decrees,

* Note by the Market Supply Committee.

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M. Laval, the Prime Minister, draws attention to three decrees dealing with the meat market. The aim of the Government's action is two-fold; (1) to improve the position of the producers and ensure that they get a somewhat larger profit than they have been getting of late, and (2) to protect consumers by taking bad quality meat off the market and bringing about a fall of retail prices.

One decree makes it possible to utilize the credits voted by Parliament and make immediate use of the laws for preventing bovine tuberculosis and cleaning up the meat market.

The Minister of Agriculture has proposed a decree which will enable the Government to take inferior animals off the market by direct purchase. These purchases will be made for cash on days advertised in advance by the authorities, and the business will be managed by special purchasing boards. The animals thus purchased, which may amount to about 150,000 head, will be slaughtered and the meat will be rendered uneatable and destroyed.

The second decree assures the Minister of Agriculture the credits necessary for establishing or improving slaughter-houses with modern equipment, and capable of treating the meat on the spot in the cheapest manner at centres of production.

Another decree authorizes Prefects to fix a maximum retail price for meat in each department should this be necessary. In fixing these prices regard will be had to all the elements entering into the cost of production, particularly the wholesale prices paid by the butchers.

Butchers must be ready to give proof to the supervising officials that they have actually paid the prices. They must also show on tickets, one outside and the other inside the shop, the selling price of the cuts which have been controlled by the Prefects' order.

If the prices fixed are exceeded, the butchers will be brought before the Departmental Court, which will have power to inflict punishment ranging from a simple warning to the closing of the shop for a given time. Similar measures will apply to pork butchers.

Food Prices and Wages in Germany.*—Recent press notices outside Germany draw attention to a growing shortage of foodstuffs in that country, attended by a rising tendency in retail prices. Some confirmation of these reports, so far as prices are concerned, is forthcoming from the German official statistics. The official cost-of-living figure for food in June, 1935, was 120.6 (1913-14=100) as against 117.8 in June, 1934, and 113.7 in June, 1933.

The relation of German food prices to wages was treated in a novel manner in an article published a short time ago in the *Praeger Tagblatt*. A comparison was made of retail prices and workers' wages in Prague and a German provincial town of about the same size. For Germany the official figures of food prices in April and May, 1935, were taken. The information in regard to wages came from the statistics published by the International Labour Bureau. From the data collected the following comparison of food prices was made:—

		Prague (Kronen)	German Town (Kronen)
Bread	1 kilogram	2.40 to 3.00	3.50
Roll	1	0.25	0.40
Flour (foreign)	1 kilogram	3.10	5.60
Beef	"	12.00 to 16.00	24.00
Veal (good)	"	18.00 to 24.00	32.00 to 34.00
Fowl (average)	1	16.00	23.00
Egg (April)	1	0.60	1.20
Cooking butter	1 kilogram	16.00 to 18.00	29.00
Milk	1 litre	1.60	2.70
Coffee (prime quality) ..	1 kilogram	56.00	70.00

* Note by the Market Supply Committee.

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		<i>Prague</i> (Kronen)	<i>German Town</i> (Kronen)
Loaf sugar	 1 kilog	6.30	8.80
Rice (medium quality)	 ,,	3.00	5.60
Apples (good)	 ,,	10.00	11.00
Orange	 1	0.80	1.20

Food prices, especially eggs, butter and meat, have always been lower in Czechoslovakia, but there is little difference as regards rent, light, heat and clothing between the two countries. On the whole, the cost of living in the German provincial town is said to be about one-third higher than in Prague; while net wages are now at about the same level.

German wages fell by about 22 per cent. between 1930 and 1934, while contributions for social services increased. During the same period, wages in Prague showed little or no change.

Propaganda to Encourage Milk Consumption in Belgium.*

At the first meeting of the committee, which was recently appointed under the Chairmanship of the Minister of Agriculture, to develop milk consumption in Belgium, the Ministry's Principal Inspector, who is Commissioner General for Propaganda, outlined the directions which propaganda should take, as follows:—

- (1) Among producers: improved hygiene in cowsheds. To this end, special efforts should be made by (a) agriculturists working in conjunction with producers for the large centres, (b) veterinary inspectors in fighting disease, (c) agricultural associations in reaching the small farmer.
- (2) Among distributors: delivery of milk to the consumer in the best possible condition. To this end, the efficient collaboration of the various health services and the representatives of the milk trade associations was desired.
- (3) Among consumers: popular education in regard to the nutritive value of milk and the advantages of its consumption. To this end the collaboration of the teaching profession, delegates of the Youth Association, doctors, nurses, and Women's Institutes was requested. A "milk week" is announced to take place in September, to be preceded and succeeded by continuous propaganda.

* Note by the Market Supply Committee.

AUSTRALIAN WHEAT INDUSTRY

THE Second and Final Report of the Commonwealth of Australia Royal Commission on the Wheat, Bread and Flour Industries was issued in February, 1935. It gives a complete economic survey of the industries of growing, handling and marketing wheat and wheat products: it is extremely comprehensive and may be summarized as follows:—

Section I deals with the world wheat situation; the Commission find that the Australian wheat problem is part of the great world problem which has radically changed the economic outlook for over 70 per cent. of agricultural producers. The gap between costs of production and current prices of rural products is the measure of rural distress and almost every country has adopted devices for alleviating the burden of depressed prices upon primary producers. The effect of these expedients has been to diminish world trade and to intensify the economic distress of countries which depend on external markets as an outlet for many of their primary products. The urgent need for constructive planning is therefore apparent. The crisis in wheat is attributed to disturbances in international supply caused by the War, expansion in wheat acreage in "new" countries and the return of European countries, particularly Russia, to normal production. As regards the Australian wheat industry, the Report says that reorganization must lead to a natural restriction in acreage by the abandonment of wheat-growing in unsuitable areas. It is suggested that the future wheat policy of the Commonwealth should be on the following lines:—

- (a) the maximum contribution by Australia to the solution of the problem of the revival of international trade; especially the maintenance of active trade relations with all countries which are prospective purchasers of wheat and flour;
- (b) a review of all items in the cost of production, including debts and interest;
- (c) the adoption of agricultural reorganization in such districts or on such farms as cannot be utilized for the economic production of wheat;
- (d) scientific effort to maintain soil fertility;

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- (e) avoidance of any increase in the gross annual average production in the Commonwealth. (The desirability of conforming to such world-wide agreements as may be made in respect to this matter is emphasized.)

Section II contains an economic survey of the farming operations of 524 wheat-growing farmers in the various States—a representative sample. A “wheat-grower” is defined as one who annually plants more than 100 acres under wheat and who obtains the major part of his livelihood from growing the crop. Of 60,000 to 70,000 growers in Australia, between 40,000 and 45,000 come within this definition. The survey shows that under present circumstances there is a tendency to keep more sheep and grow less wheat. Australian methods of wheat production require the use of a fairly large amount of machinery. Some farmers are relatively inefficient in their operations as they are farming under a system unsuitable to the type of soil.

Section III is a survey of the industry's indebtedness. Apart from labour, the interest on borrowed capital is the largest single item in the costs of the average wheat grower. The total debt of Australian wheat growers is estimated at £151,000,000 (Australian £), of which sum £37,000,000 is due to private mortgagees, £33,000,000 to Joint Stock Banks, £30,000,000 to Government Organizations (other than State Banks), £20,000,000 to State Banks and £14,000,000 to Trustee, Assurance and other Finance Companies. Unsecured and partly-secured creditors account for £15,000,000 exclusive of considerable sums written off. The estimated liabilities do not take into account large sums invested privately by farmers in their properties.

The total value of the assets in stock, machinery and land is estimated at £136,000,000.

The distribution of debts according to farm acreage, and according to various classes of creditors, demonstrates that the major problem of the wheat industry as a whole is the amount of indebtedness in districts in which wheat production is uneconomic at existing price levels.

Section IV deals with some of the most important factors in costs. Some farmers have at present more machinery than they require, and it is a question whether from the point of saving in time the use of costly modern machinery in place of strippers and winnowers is justifiable in districts where long periods of favourable harvesting weather may be expected. The farmer's chief concern is that the price he

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receives for his product has fallen far more than the price he has to pay for machinery. The fall in the value of the Australian pound has been a contributing factor, although, generally, the Australian farmer is now paying no more for his machinery than if it were imported duty free. The Commission suggests that as the agricultural machinery industry is now firmly established in Australia, and is an essential part of that section of the national life which is concerned with rural production, it should be organized on public utility lines.

The wheat industry of Australia is of great importance to the railway systems of the country. The Commission, having examined railway freights, considers that relief to farmers by reduction in freights would, under present conditions of interest and costs, be at the expense of the general body of taxpayers. Direct assistance from other sources seems wiser as it is recognizable as such.

Section V deals with the marketing of wheat. The Commission finds that the f.a.q. system of selling wheat, although cheap and simple, is relatively inefficient and definitely unjust to districts and farmers producing high-grade wheats. It is probable that an increase in the exchange rate would assist the farmer and enable him to reduce his indebtedness, but a controlled marketing scheme would appear to be necessary to ensure the full benefits from any increase in the rate of exchange. Under the present system of marketing, farmers are prone to flood the market when prices are high and thus depress prices; when prices are low they tend to withhold supplies so that there is risk of a large carry-over. The present system would not be adequate to control exports if international agreements required that exports be limited. A marketing control organization would provide an alternative method for enabling the Commission's recommendation for a home consumption price to be implemented, but safeguards would be required to control any tendency to raise local prices unduly.

Section VI and Appendix F deal with the "quality" problem in the flour obtained from Australian wheats.

Section VII reviews the position as regards scientific knowledge extension and education services, and finds that there is urgent need for more technical assistance to the wheat industry and also for extension services in connection with farming and the home life of the farmer. The Com-

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mission finds that there is lack of precise statistical information regarding the industry in States other than New South Wales, and points out that the collection and publication of reliable data is important as the basis for international agreements. There is a serious shortage in the Commonwealth of a specially trained staff available for the carrying on of economic investigations into agricultural problems.

Section VIII deals with agricultural reconstruction. Various schemes that have been adopted in other wheat-growing countries of the world are analysed. Such schemes embrace a reduction of interest rates; compulsory reduction of debts; the provision of long-term and intermediate credit organisations; the facilitation of compositions and, in appropriate cases, bankruptcy; the suspension of part of the secured and unsecured debts for a period of years.

The principal recommendations of the Commission are given below:—

Assistance should be afforded by the Commonwealth to the wheat industry from the proceeds of an excise duty on flour used within the Commonwealth. It is estimated that, with a wheat price of 2s. 6d. a bushel, the sum raised by a flour excise of £5 2s. per ton would amount to £3,250,000. If this method were found impracticable the principle of a home consumption price should be applied in some other manner, e.g., by means of a levy on wheat through the agency of a compulsory marketing scheme. In any event, a compulsory marketing scheme for Australian wheat should be adopted if the majority of farmers of each of three wheat-growing States approve. (One member of the Commission dissented from this recommendation.) With a view to facilitating debt adjustment in the industry, the Commission recommends that legislation be enacted for effecting by agreement compositions of debts and extensions of time and for schemes of readjustment in accordance with the ability of farmers to pay. The cost of administering the debt adjustment scheme is estimated at £300,000 per annum, while £3,000,000 would be required for a "revolving" fund for making loans to farmers. A fund of £1,200,000 would be needed for reconditioning machinery and £1,000,000 for long-dated loans for permanent improvements. The question of the desirability of raising the rate of exchange between Australia and London should be considered by the Commonwealth Bank Board. A body should be set up to investigate matters in connexion with

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the use of machinery in wheat-growing, such a body being under the direction of the Wheat Marketing Board and financed by a levy on wheat not exceeding one-fiftieth of a penny per bushel. The Commission urges the adoption of standardization of agricultural machinery, and states that some of the subsidy should be applied to further the use of producer-gas as a cheap fuel for power-farming. As regards the f.a.q. system, the adoption of any new system should have regard to the cleanliness and quality of the grain. Regard should be had to the production of varieties of wheat having "strength" in addition to other typical Australian characteristics, and millers should guarantee premiums for such wheats. A systematic study of seasonal and district characteristics of each wheat harvest should be made with a view to remedying defects. The Department of Commerce, in conjunction with the wheat and milling industries, should make a study of the types of flour required by overseas countries. In conclusion, the Commission says that the Commonwealth should take steps to keep in close touch with the economics of rural production in the country, so as to continue the data now available, reduce the need for further investigations and maintain a specially trained staff for such investigations.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1935

ACREAGE UNDER CROPS AND GRASS AND NUMBERS OF LIVE STOCK
ON HOLDINGS ABOVE ONE ACRE IN EXTENT IN ENGLAND AND
WALES AS RETURNED BY OCCUPIERS ON JUNE 4, 1935.
(The figures for 1935 are subject to revision.)

Crops and Grass

Distribution	1935	1934	Increase		Decrease	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Per cent.</i>	<i>Acres</i>	<i>Per cent.</i>
TOTAL ACREAGE under all CROPS and GRASS	24,948,000	25,030,000	—	—	82,000	0·3
*ROUGH GRAZINGS	5,422,000	5,424,000	—	—	2,000	—
ARABLE LAND	9,394,000	9,250,000	144,000	1·6	—	—
PERMANENT GRASS :						
For Hay	4,637,000	4,823,000	—	—	186,000	3·9
Not for Hay	10,917,000	10,958,000	—	—	41,000	0·4
TOTAL	15,554,000	15,781,000	—	—	227,000	1·4
Wheat	1,771,000	1,759,000	12,000	0·7	—	—
Barley	793,000	861,000	—	—	68,000	7·9
Oats	1,416,000	1,402,000	14,000	1·0	—	—
Mixed Corn	94,000	96,400	—	—	2,400	2·5
Rye	20,600	17,500	3,100	17·7	—	—
Beans, for stock feeding or seed	133,100	151,900	1,900	1·3	—	—
Beans, for market or canning ...	20,700					
Peas, for stock feeding or seed	42,300					
Peas, for canning or packeting, green or dried	26,900	143,000	—	—	10,200	7·1
Green Peas, for market	63,600					
Potatoes, first earlies	55,100	487,600	—	—	24,900	5·1
Potatoes, main crop including second earlies	407,600					
Turnips, for stock feeding or seed	199,000	520,400	—	—	23,000	4·4
Swedes, for stock feeding or seed	276,300					
Turnips and Swedes for human consumption	22,100					
Mangold	250,700	246,400	4,300	1·7	—	—
Sugar-Beet	367,200	396,300	—	—	29,100	7·3
Kohl-rabi and Rape	57,200	62,900	—	—	5,700	9·1
Cabbage, Savoys and Kale for fodder	112,500	74,000	38,500	52·0	—	—
Cabbage, Savoys, Green Kale and Sprouting Broccoli for human consumption	37,500	37,000	500	1·4	—	—
Brussels Sprouts	34,100	34,000	100	0·3	—	—
Cauliflower or Broccoli (non-sprouting)	19,500	20,100	—	—	600	3·0

* Mountain, Heath, Moor, Down and other rough land used for grazing.

AGRICULTURAL RETURNS, 1935

Distribution	1935	1934	Increase		Decrease	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Per cent.</i>	<i>Acres</i>	<i>Per cent.</i>
Carrots	15,800	16,400	—	—	600	3·7
Vetches or Tares	53,700	52,600	1,100	2·1	—	—
Lucerne	35,900	34,200	1,700	5·0	—	—
Hops	18,000	18,000	—	—	—	—
Small Fruit	59,800	61,000	—	—	1,200	2·0
Orchards	262,100	254,900	7,200	2·8	—	—
CLOVER & ROTATION GRASSES:						
For Hay	1,388,000	1,290,000	98,000	7·6	—	—
Not for Hay	945,000	783,000	162,000	20·7	—	—
TOTAL	2,333,000	2,073,000	260,000	12·5	—	—
BARE FALLOW	286,000	340,000	—	—	54,000	15·9

According to the returns made by occupiers of agricultural holdings exceeding one acre in extent, the total area of agricultural land in England and Wales on June 4, 1935, was 30,370,000 acres, compared with 30,454,000 acres in 1934, a reduction of 84,000 acres or 0·3 per cent. The area returned as under crops and grass was 24,948,000 acres, a decrease of 82,000 acres or 0·3 per cent. Contrary to the general trend in recent years, the total area of rough grazings at 5,422,000 acres showed a small decrease of 2,000 acres compared with the previous year. For the first time since the War the steady decline in the arable area has been arrested, and there was an increase upon the area in 1934 of 144,000 acres (1·6 per cent.) to 9,394,000 acres; the total arable area is now rather larger than in 1932. This increase was due almost entirely to the expansion in the area under clover and rotation grasses. On the other hand the area actually under crops, excluding clover and rotation grasses, at 6,775,000 acres showed a decline of 62,000 acres or 0·9 per cent. on 1934. A further substantial reduction of 15·9 per cent. to 286,000 acres occurred in the area of bare fallow. This was the lowest figure returned as under bare fallow for several years. For the second year in succession there was a reduction in the area of permanent grass amounting to 227,000 acres, representing 1·4 per cent., the acreage under permanent grass of 15,554,000 acres being very little more than in 1930.

The total area under cereals declined by 41,300 acres or 1 per cent. to 4,094,600 acres, increases in wheat, oats and rye being more than counterbalanced by a substantial reduction in the acreage of barley and a smaller decrease in mixed corn. The potato acreage showed a further moderate decrease, and there was again a reduction in the area under roots, a small increase in the acreage of mangolds being more than offset by the decline in the acreage under turnips and swedes. After a substantial increase in the previous year the sugar-beet acreage in 1935 showed a moderate decline. There was a small decline in the area under the four principal vegetables, but a further net increase in the acreage devoted to fruit. The acreage of hops was unchanged.

Cereals.—There was a small increase of 12,000 acres (0·7 per cent.) in the area under wheat, the total area in England and Wales being returned as 1,771,000 acres. This increase in the wheat acreage has mainly occurred in the Eastern and North-Eastern Divisions. Norfolk being the county showing the largest individual change. In the rest

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of the country there were no substantial variations in the acreages returned, as compared with the previous year, with the exception of the county of Salop, where there was again a marked increase.

The revival in the barley acreage that was a feature of the returns in 1934, was not maintained, and there was a decline of 68,000 acres to 793,000 acres or 7.9 per cent. The principal changes occurred in the Northern and North-Eastern Divisions, where there were decreases of 14,900 acres (18.7 per cent.) and 27,500 acres (8.5 per cent.) respectively. Small decreases also appeared in most of the rest of the country.

There was a minor increase in the acreage under oats of 14,000 acres (1 per cent.), which raised the area to 1,416,000 acres, whereas in each of the previous five years there had been a steady decrease. The principal increase was shown in the South-Western Division, notably in Devon and Cornwall, and similar rises occurred in most of the arable counties in the Eastern part of England, which were offset to some extent by a decline in the North-Western Division, where the major part of the decrease occurred in the county of Chester. A rather smaller reduction was revealed in North Wales.

Mixed corn was grown on 94,000 acres, a reduction of 2,400 acres (2.5 per cent.) upon last year, but the area under rye showed a substantial increase of 3,100 acres (17.7 per cent.) to 20,600 acres.

Beans and Peas.—The total area under beans amounted to 153,800 acres, a rise of 1,900 acres (1.3 per cent.) compared with 1934, a general increase of 3,600 acres in the two Midland Divisions being partly offset by small decreases in other Divisions and mainly in the North-Eastern.

In the case of peas the total acreage showed a decline of 10,200 acres (7.1 per cent.) to 132,800 acres. The reduction was fairly general and was most marked in the Lindsey and Holland Divisions of Lincoln, but exceptionally an increase of nearly 10 per cent. occurred in the West Riding of Yorkshire.

Owing to certain changes in classification in the 1935 Schedules, designed primarily to distinguish better between crops for human consumption and those fed to stock, it is only possible to make comparisons with previous years in the case of the total areas under beans and peas respectively.

Potatoes.—A further decline amounting to 24,900 acres (5.1 per cent.) reduced the acreage under potatoes to 462,700 acres. This figure, which includes every area of $\frac{1}{2}$ acre and upwards returned as under potatoes, is necessarily higher than that recently published by the Potato Marketing Board, which related only to the acreages grown by Registered Producers of one acre or more of potatoes. The decrease in area was general throughout the country with the exception of the Holland Division of Lincoln and the Isle of Ely, where small increases occurred. The main reductions occurred in the North and North-Western Divisions, and particularly in the West Riding of Yorkshire and Lancashire.

Sugar Beet.—In view of the limit imposed by the Government on the acreage of sugar beet the produce of which would be eligible for subsidy, there was not unnaturally a decrease in the area under this crop. The acreage of 367,200 acres showed a decline of 29,100 acres or 7.3 per cent. upon that grown in 1934. Even so the area devoted to the beet crop is greater than in any earlier years. The county of Norfolk was responsible for over one-third of the net reduction, which was otherwise generally distributed over the counties growing sugar beet in any quantity, with the exception of Kesteven, Nottingham and Worcester where small increases were returned.

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Fodder Roots.—There was a further reduction in the area under turnips and swedes, the total of 497,400 acres being 23,000 acres (4.4 per cent.) less than in 1934. A further new low record was thus established, and the decline reflected the general downward trend extending over many years. Decreases occurred in most counties, and noticeably in the North and West Ridings of Yorkshire, but a small net increase appeared in the North-Eastern Division. The area under mangolds again showed an increase this year of 4,300 acres (1.7 per cent.) to 250,700 acres. Increases were evident in the majority of counties, with the exception of the South-Western and South-Eastern Divisions, where smaller acreages were returned.

Vegetables for Human Consumption.—There was a small rise in the area under cabbage, including savoys, green kale and sprouting broccoli, of 500 acres (1.4 per cent.) to 37,500 acres, as compared with 1934. A still smaller increase of 100 acres (0.3 per cent.) occurred in the area under brussels sprouts which, at 34,100 acres, was approximately the same as in 1934, while the areas under carrots and cauliflower or broccoli declined in each case by 600 acres to 15,800 and 19,500 acres respectively.

Other Crops.—A very marked increase is shown in the area under cabbage, savoys and kale for fodder, which, at 112,500 acres was greater than last year's area by 38,500 acres or no less than 52 per cent.: every county contributed to the larger area under these crops. There was a contraction in the acreage of kohl-rabi and rape of 5,700 acres or 9.1 per cent. to 57,200 acres, but vetches and tares and lucerne showed small increases of 1,100 acres (2.1 per cent.) and 1,700 acres (5.0 per cent.), the areas being 53,700 and 35,900 acres respectively. There was no change in the acreage devoted to hops.

Fruit.—The total fruit acreage showed a further net increase of 6,000 acres, but the larger area of orchard fruit, which rose by 7,200 acres (2.8 per cent.), was partly offset by a small decline of 1,200 acres (2.0 per cent.) in the area devoted to small fruit. The main addition to the orchard area was in Hereford, Gloucester, Worcester, Somerset, Devon and Kent. The decline in the area under small fruit was particularly noticeable in Kent; but small changes occurred in other parts of the country.

Clover and Rotation Grasses and Meadow Hay.—There was a substantial increase in the area under clover and rotation grasses, which rose by 260,000 acres or 12.5 per cent. to 2,333,000 acres. Of this total 1,388,000 acres were returned as intended for hay—an increase of 98,000 acres (7.6 per cent.) over 1934, while the area not destined for mowing this year was 945,000 acres or 162,000 acres (20.7 per cent.) greater than in the previous year. The area under meadow hay of 4,637,000 acres this year showed a decline of 186,000 acres (3.9 per cent.) compared with 1934. Altogether the total area of hay was, therefore, 88,000 acres less than the acreage returned last year.

Live Stock

With the exception of pigs all classes of live stock were fewer in 1935 than in the previous year. The most marked change was the substantial increase of 14.8 per cent. in the total number of pigs.

CATTLE

For the first time since 1930 there was a net reduction in the number of cattle, the total of 6,538,600 being 1.8 per cent. or 121,600 less than in 1934. A further increase was recorded in the dairy herd, which, at 3,049,700 resulted in a new maximum figure for this class. The rise in the number of cows and heifers in milk of 17,100 (0.8 per

AGRICULTURAL RETURNS, 1935

	1935	1934	Increase		Decrease	
	No.	No.	No.	Per cent.	No.	Per cent.
Cows and heifers in milk	2,231,000	2,213,900	17,100	0·8	—	—
Cows in calf, but not in milk	382,200	363,900	18,300	5·0	—	—
Heifers in calf	436,500	417,300	19,200	4·6	—	—
Other cattle: two yrs. and above	1,008,600	1,041,400	—	—	32,800	3·1
Other cattle: one yr. and under two	1,313,600	1,369,100	—	—	55,500	4·1
Other cattle: Under one yr.	1,166,700	1,254,600	—	—	87,900	7·0
TOTAL OF CATTLE	6,538,600	6,660,200	—	—	121,600	1·8

cent.) was relatively smaller than in the case of cows in calf but not in milk, which were higher by 18,300 (5·0 per cent.), and heifers in calf, where there was an increase of 19,200 or 4·6 per cent. The increase in the dairy herd has mainly taken place in the Western and Northern half of England, particularly in Lancashire and Cheshire, and in Wales, small decreases being returned in many of the Eastern and South-Eastern counties. There was a general decline in all classes of "other cattle," which was most noticeable, however, among those under 1 year. "Other cattle," 2 years old and above, declined by 32,800 (3·1 per cent.), the only noteworthy increases occurring in Northumberland and Cumberland, most other counties both in England and Wales contributing to the net decrease. Those 1 year old and under 2 years showed a reduction of 55,500 (4·1 per cent.), and there was a still larger reduction of 87,900 (7 per cent.) in the numbers of "other cattle" under 1 year including calves. The decrease in the two latter classes was fairly general throughout England and Wales.

SHEEP

	1935	1934	Increase		Decrease	
	No.	No.	No.	Per cent.	No.	Per cent.
Ewes kept for breeding	7,120,700	7,308,300	—	—	187,600	2·6
Other Sheep—						
One year and above	1,775,900	1,702,600	73,300	4·3	—	—
Over 6 months and under one year	438,600	528,500	—	—	89,900	17·0
Under six months	7,135,500	6,987,600	147,900	2·1	—	—
TOTAL OF SHEEP	16,470,700	16,527,000	—	—	56,300	0·3

Although the total number of sheep in the country at 16,470,700 showed a small decrease of 56,300 (0·3 per cent.) the decline was

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restricted to ewes kept for breeding and "other sheep" between 6 months and 1 year old, larger numbers being returned in the other classes. The number of ewes kept for breeding fell by 187,600 (2.6 per cent.) to 7,120,700, but the reduction was by no means general, the Northern and North-Western Divisions and Wales showing increases which were, however, insufficient to offset the substantial decline which occurred in other parts of the country. A still larger relative decline of 89,900 (17 per cent.) to 438,600 occurred in "other sheep" over 6 months and under 1 year old; the decline was fairly general, both in England and Wales, few counties showing any exception to the downward trend. The number of "other sheep" 1 year old and above at 1,775,900 gave an increase of 73,300 (4.3 per cent.) over 1934. The rise in the numbers of this class was outstanding in the East Riding of Yorkshire. "Other sheep" under 6 months old showed an increase of 147,900 (2.1 per cent.) to 7,135,500, but increases in the western and northern part of the country—particularly in the Northern Division and Wales—were offset by a decline in other areas.

PIGS

	1935	1934	Increase		Decrease	
	No.	No.	No.	Per cent.	No.	Per cent.
Sows kept for breeding	493,900	450,400	43,500	9.7	—	—
Other Pigs—						
Over 2 months	2,122,800	1,901,300	221,500	11.6	—	—
Under two months	1,195,000	968,500	226,500	23.4	—	—
TOTAL OF PIGS	3,811,700	3,320,200	491,500	14.8	—	—

A further considerable expansion took place in the number of pigs in the country, the total of 3,811,700 showing an increase of 491,500 or 14.8 per cent. compared with 1934, the highest yet recorded. All classes of pigs were responsible for the general growth in the pig population. In the case of sows kept for breeding the increase was 43,500 (9.7 per cent.) or rather less than the rise in the previous year, but substantially greater changes were shown in "other pigs" over 2 months old, which rose by 221,500 (11.6 per cent.) to 2,122,800 and in "other pigs" under 2 months, where the increase amounted to 226,500 (23.4 per cent.), and brought up the numbers of this class to 1,195,000.

With "sows kept for breeding" the increase was general throughout the country with a few minor exceptions, although there was no outstanding change in any individual county. The same trend was noticed in the case of "other pigs" over 2 months old, but in Yorkshire, Lancashire and Somerset the rise was more marked than elsewhere. All divisions contributed to the increase in the numbers of young pigs under 2 months old, which was, however, particularly noticeable in the South-Western Division, where there was a gain of no less than approximately 50,000.

HORSES

In accordance with the general tendency for many years, the total number of horses of 873,500 again decreased, but as in 1934 there was an increase in the number of "unbroken horses" both under and over 1 year old. The larger rise was among unbroken horses

AGRICULTURAL RETURNS, 1935

	1935	1934	Increase		Decrease	
	No.	No.	No.	Per cent.	No.	Per cent.
Horses used for agricultural purposes (including Mares for breeding)	586,000	596,300	—	—	10,300	1·7
Unbroken Horses (including Stallions)						
One year and above	96,000	87,700	8,300	9·5	—	—
Under 1 year	47,000	43,800	3,200	7·3	—	—
Other Horses ...	144,500	157,800	—	—	13,300	8·4
TOTAL OF HORSES	873,500	885,600	—	—	12,100	1·4

over 1 year, where the numbers increased by 8,300 (9·5 per cent.) to 96,000, but the increase in foals of 3,200 (7·3 per cent.) was greater than that of 2,600 (6·2 per cent.) returned a year earlier. There was a decline of 10,300 (1·7 per cent.) in the number of horses used for agricultural purposes (including mares for breeding), but the decrease of 13,300 (8·4 per cent.) in other horses was actually and relatively greater.

POULTRY

	1935	1934	Increase		Decrease	
	No.	No.	No.	Per cent.	No.	Per cent.
	Thousands	Thousands	Thousands		Thousands	
Fowls over 6 months old	26,579	27,890	—	—	1,311	4·7
Fowls under 6 m'ths old	31,551	33,440	—	—	1,889	5·7
TOTAL ...	58,130	61,330	—	—	3,200	5·2
Ducks ...	2,481	2,452	29	1·2	—	—
Geese ...	646	650	—	—	4	0·6
Turkeys ...	687	788	—	—	101	12·8

Last year the rapid rate of increase in the number of fowls which had been a feature of post-war years, was considerably reduced, and in 1935 the total number of fowls declined by 3,200,000 (5·2 per cent.) to 58,130,000, thus bringing the figure below that of 1933. With few exceptions the decline was general throughout England and Wales, and was shared both by fowls over and under 6 months old.

Unlike other classes of poultry, the number of ducks showed a rise of 29,000 (1·2 per cent.) to 2,481,000. The increase has mainly occurred among ducks under 6 months old in Norfolk and the West

AGRICULTURAL RETURNS, 1935

Riding of Yorkshire. A further small decline occurred in the number of geese of 4,000 (0.6 per cent.), bringing the total number down to 646,000. In the case of turkeys the decrease amounted to 101,000 (12.8 per cent.), giving a total of 687,000; most counties contributed to this decline.

Agricultural Workers

	1935	1934	Increase		Decrease	
	No.	No.	No.	Per cent.	No.	Per cent.
Regular Male Workers :						
21 years old and over	412,400	415 500	-	—	3,100	0.7
Under 21 years old	104,500	107,100	--	--	2,600	2.4
TOTAL ...	516,900	522 600	—	—	5,700	1.1
Casual Male Workers :						
21 years old and over	67,700	72,400	—	-	4,700	6.5
Under 21 years old	9,200	9,300	--	--	100	1.1
TOTAL ...	76,900	81,700	-	—	4,800	5.9
TOTAL MALE WORKERS, Regular and Casual	593,800	604,300		—	10,500	1.7
Women and Girls :						
Regular Workers	50,000	53,200	--	—	3,200	6.0
Casual Workers	28,300	30,500	—	—	2,200	7.2
TOTAL ...	78,300	83,700	—	-	5,400	6.5
TOTAL WORKERS, all classes	672,100	688,000	—	--	15,900	2.3

All classes of agricultural workers showed a decline in numbers as compared with the previous year, but the total decrease to 672,100 of 15,900 was only 2.3 per cent. against a decrease of 27,600 (3.9 per cent.) in 1934. There was a relatively small decrease of 3,100 (0.7 per cent.) in the number of regular male workers over 21 years old, but heavier decreases were recorded among both male and female casual workers of 5.9 and 7.2 per cent. respectively, which may have been due to the delay in seasonal work owing to late frosts in May. The total decline in the number of female workers as a whole reduced their numbers by 5,400 (6.5 per cent.) to 78,300.

SEPTEMBER ON THE FARM

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UNDER average conditions, September marks the end of one period in cultivation and the beginning of another. In a wet corn harvest, however, the next season's work, such as carting manure or ploughing the stubbles, may have to be started before all the stooks have been carted off. A field presents a depressing sight when, through bad weather, cultivation has had to be begun while there are stooks still uncartered, especially if there are patches of green on the sheaves, showing that the grain has germinated. Fortunately, such harvesting conditions are not frequent.

Similarly, to most owners of grass sheep flocks, September is an intervening month; most of the lambs, and also a proportion of the ewes have been sold. Where the flying flock system is practised, this is the time for buying in a fresh lot of ewes, and, in the store sheep districts, auctioneers' announcements of store ewe sales are to be seen everywhere. Wethers, for fattening on grass, and for later finishing on arable land, are also bought about this time.

Live Stock on Stubbles.—Until a generation ago, it was not unusual to see gleaners, generally women and children, picking up ears of corn left after harvesting. The practice has died out, not only for economic reasons, but also because the binder does cleaner work than the mowing machine or the scythe. Poultry, and sometimes pigs, are now taken on the stubbles, an effective method of cashing the grain which has been shed, or the ears of corn which may have been lost when cutting a badly-laid crop. Poultry give good results on stubble, the birds seeming to enjoy the change of ground. Hardy, writing in *The Farmer and Stockbreeder* (July 29) sounds a note of warning, however, on this point. Wild birds, such as starlings and sparrows, and also game, are sometimes affected by coccidiosis, and poultry might pick up the coccidia off the stubbles; in the same way partridges might become infected from the poultry. The risk of infestation in this way would probably not deter many from putting out their poultry, since, where-

SEPTEMBER ON THE FARM

ever they were stocked, they could not be kept away from the more familiar wild birds.

Sheep make good use of stubbles; and, mountain sheep in particular, always seem to take readily to this kind of land. There is a danger of sheep eating too much grain when put on bean or pea stubbles. In one instance, 9 sheep out of 300 died within a day through eating too many beans. Sheep clear up many weeds, besides picking up much good food in the hedgerows.

Where heavy stocks of sheep are maintained on grass land, and no special crops are grown for them, valuable additional grazing can be provided for them by sowing Italian rye-grass in the spring corn which is not being seeded down. In the north of Britain, where no special catch crops can be grown, this is one way of providing a useful substitute. About 12 lb. of the rye-grass seed to the acre, sown directly after the corn, before harrowing, provide a good bite in the stubbles at little additional cost and labour. Italian rye-grass is specially suitable because of its comparatively rapid growth in autumn and winter, and because of its capacity for quick recovery after hard grazing; if the stubble is given an interval of about a fortnight after a period of close grazing, it shows up green again, and is ready for further stocking. The young rye-grass is very nutritious, consisting of a large proportion of leaf, and it may be used for fattening sheep. At one farm, mountain wether lambs are now fattened in this way, instead of on rape. Rape, sown about the first week in August, following a silage crop, was used for many years, but has been replaced by the rye-grass mainly because it aggravated the position with regard to "finger-and-toe" disease of swedes. The objection to sowing the rye-grass is that, in a wet harvest, it makes the sheaves more difficult to dry. Again, if the stubble is ploughed soon after the harvest, the return obtained for the catch crop is correspondingly diminished. Many farmers, on being taken over such stubbles, inquire whether the rye-grass roots give any difficulty in the subsequent cultivation. It can be said with confidence that no difficulty of this kind is experienced on heavy and medium soils; it is possible that greater root development would take place on lighter land.

Sowing of Wheat.—One hears, now and again, the old adage that wheat should be sown in time for it to be out of

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the ground " to see the old crop carted off." Few growers, however, would care to sow their crop so early. October is the month when most wheat is sown, though the latter half of September is better if the ground can be prepared in time. December and January are sometimes described as the two " dead months," and it is said that, excepting these two months, winter wheat may be sown at any time from August to February.

On the mechanized wheat farms, there is intense activity from the time harvesting begins up to the end of the autumn sowing, and any delay is serious. On one such farm, where the artificial manure distributor and corn drill were combined in one implement, the manager did not speak highly of such a machine because any delay caused through the former not functioning properly also held up the sowing. Incidentally, some growers prefer separate corn drills to one wide implement of 28 or 32 coulters, particularly where the ground undulates.

There are several materials suitable for dressing the seed against Bunt. Dry pickling methods are gaining favour because treatment is easy, germination is not affected and the seed need not be sown immediately after treatment. Copper carbonate, in finely-powdered or " dust " form, used at the rate of 2 oz. per Imperial bushel, gives quite satisfactory results unless the seed grain is very highly contaminated with Bunt-spores. Certain proprietary organic mercury compounds in powder or dust form are now on the market, and can also be used with success. Wet treatment is usually done with either copper sulphate (bluestone) solution or with formalin, and, if carried out according to instructions, is safe and satisfactory. Full particulars will be found in the Ministry's Bulletin No. 24, *Cereal Smuts and Their Control*.*

Rooks and other birds give considerable worry in some districts. Some of the older farmers tell us that rooks cannot cause much damage to grain properly sown in adequately prepared land. Such remarks, however, are not generally made until control of the farm has been handed over to one of the younger generation. One cannot wholly agree with this, but " there is a lot in it." Attacks by birds often give results that surprise the farmer. In one instance, a field of autumn-sown wheat was attacked daily by flocks

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 5d., post free 6d.

of starlings for some weeks after sowing, and it was fully expected that the crop would be a total failure. The crop, however, was far from being a failure, and it was concluded that the starlings were only concerned with wireworms.

Buying Ewes.—The rise in the popularity of grass sheep brings an increasing number of English farmers to the sales of mountain sheep now taking place in the mountainous districts of England and Wales. There is little change in the total number of sheep in Britain, but, as pointed out by Professor R. G. White in a paper read at the Farmer's Club, there has been a great change in the internal composition of the sheep population, there being an increase in the numbers in the grass areas, and a corresponding decrease in the arable areas. If the prices for the various kinds of agricultural produce maintain their present comparative positions, it is probable that there will be an increase in the number of sheep in the arable areas, but that they will be grass sheep this time, or, perhaps, sheep kept mostly on grass, but helped out by arable crops from lambing until the grass appears.

The buying of ewes nowadays is almost foolproof compared with ten years ago, when liver fluke was one of the great troubles of sheep farming. All kinds of cures were tried and talked about, e.g., feeding on bran, salting of pastures, etc. In one instance, an "S.O.S." was sent to Ireland for some hundreds of ducks. The farmer who used to relate the duck story was in his "thirties" at the time of the 1880 outbreak. Under the mellowing influence of time, and in the interests of a good story perhaps, the results became more and more favourable to the ducks in his later years, and, on the last occasion that I heard the story, the sheep were said to have "never looked back from the moment the ducks were heard quacking their way up from the station." The ducks, of course, while excellent for preventing infestation, are useless as a remedy. In the 1920 attack, whole flocks were practically lost in Wales; in one instance only two survivors were left from a flock of 153. The position was rendered worse by the fact that the ewes that year cost more than they had ever done before, or have done since. Some farmers decided to cut their losses early by selling for slaughter, at a fraction of the original cost. It was not uncommon that year to see ewes actually dying in the pens during the sale. This, of

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course, was the worst attack for 40 years, but it was the kind of occurrence the possibility of which farmers had in mind when buying ewes.

Until the value of carbon tetrachloride was discovered, control measures against infestation of pastures was the usual safeguard. Buyers were also accustomed to buy from hill grazings that experience had taught them were healthy, and to keep their ewes for only one year. One can recall large buyers, who had to buy from several flocks, making a note of ear marks; and, at the end of the winter, putting the flocks in order of healthiness as shown by the mortality rates of the different lots of ewes. The experienced men would, when buying, examine the eyes of the ewes, avoiding lots if any amongst them were whitish underneath the eyelid.

The carbon tetrachloride capsule has, by to-day, largely eliminated the fluke nightmare. Sheep can now be bought without fear from most hills, and even be kept on the low ground for two or three years—in fact, until they get too bad in the teeth. By dosing the sheep after purchase, they may be cleared of any mature flukes they may have harboured when bought. When buying ewes, attention is paid to the teeth, feet and udders. At some sales, the ewes are sold as being correct in these respects, the buyer having the right to discard, before leaving the auction, any sheep not right in these points. The buyer, of course, will have made up his mind beforehand as to the age of sheep he requires, and as to whether he intends to buy ewes that have already been a year on the low ground, or to pay a little more for ewes off the mountain. Genuine mountain ewes should last for 2 or 3 years, thus cutting down the loss due to depreciation. Needless to say, ewes of a mountain breed which have been grazing a hill for a month or so before the sale are not “genuine mountain sheep.” At a well-known annual sale of mountain sheep conducted by farmers in this county, a small committee of men who know the flocks of the area examine the lots before the sale to make sure that they are as described in the catalogue, and that no dealers’ sheep are included. Those not experienced in buying mountain ewes should, even now, ask advice, not so much because of the risk of disease, but to enable them to select the right type at the right price.

Second Hay Crop.—A second crop of clover hay is

SEPTEMBER ON THE FARM

sometimes taken in August or early September, particularly where grass is plentiful and where it may not be considered advisable to buy more stock. Haymaking at this time of year is difficult, skill and good weather being essential if mouldy hay is to be avoided. The dew is not off the ground until nearly noon, and begins falling again early in the evening. Wind is a great boon. One hears it said that, to make good hay in late summer, the hay should "spend most of its time at the end of the fork."

Mouldiness can be lessened by using agricultural salt after putting each load into the stack. It would be interesting to experiment in this country with the "Solages" method of fodder preservation, as practised in some parts of France. In this method, the hay is not brought to the usual state of dryness, but is stacked when portions under the swath are still green. Salt, at the rate of about 2 lb. per cwt. of hay is used at stacking, and is said to prevent all mouldiness. Amongst the advantages claimed for this method is the fact that the fodder is thus ready salted. In all countries where weather conditions are uncertain, great attention is now being paid to methods of hay and fodder preservation that minimize the loss in the value of the crop through bad weather. The use of sweeps in haymaking reduces the period of risk, while tripods, racks, etc., as used in Scandinavia, help to get good hay in poor weather. The Solages method seems a promising contribution in this direction. One can recall so many instances where hay, all but ready for cocking, was given that extra day to make sure of harvesting it in good condition, and the weather broke.

NOTES ON FEEDING

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Wild White Clover.—This plant might be the subject of an epic; it has known every degree of public favour and disdain. Indigenous to Great Britain, and one of the commonest inhabitants of pastures and roadsides throughout the country, it was held in so little regard by farmers that its name does not appear in our literature until the end of last century.

The Rise to Fame.—The Cockle Park experiments first directed men's minds to its potency as a pasture component. The results of the sheep-feeding trials, unintelligible in any other light, were found to provide a mine of information, theoretical and practical, when the behaviour of wild white clover was examined; and a pretty little chain of reasoning was eventually evolved to explain them. The argument was rather complicated, beginning with soil physics, chemistry and biology and ending with growth responses of feeding sheep; but the central point in it was the wild white clover plant.

Next came Gilchrist's demonstrations that wild white could be used successfully in seeds mixtures. It took some time for the news to spread, for our machinery for broadcasting information was not as good as it is to-day and farmers' minds were not attuned to rapid change. Nearly 20 years went by before the farmers of Britain were convinced that wild white clover was a most important seed in a "grass" mixture; but gradually its fame spread. It raised the productivity of the English shires and the Welsh hills; it brought fortunes to the seed growers of Kent and the Cotswolds; and it literally transformed the agriculture of Scotland, where the temporary ley had been for generations regarded as a barren period in the rotation. Certainly it saved Scottish farming in the years of post-War depression; Aberdeen and Kincardine would have gone bankrupt on pre-War pastures in those dismal years. So completely did the plant dominate the minds of pundits and teachers that for a time they preached "make sure of your clover and little else matters in seeding down to grass."

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Afterthoughts.—Latterly its professional sponsors have been compelled to cry halt. Agriculture is not an industry of extremes; moderation in all things is the keynote of her philosophy. One can have too much wild white in a ley; it brings cropping difficulties. In Scotland third-year leys are often, nowadays, so good that no variety of oats can be found strong enough in the straw to follow them. There are snags from the feeder's standpoint, too.

Wild white clover is rich in ash and very rich in protein. Williams and Evans, for instance, obtained the following results in dry matter analyses of herbage from a ley under simulated pasture conditions:—

			<i>Wild White</i>	<i>Italian Rye Grass</i>
Protein—per cent.	..	..	23	17
Silica—free ash—per cent.	..	..	9	7

By comparison, however, with grasses, it does not contribute a great bulk of fodder, and a pasture in which it becomes dominant may easily yield less nutriment per acre than one in which it is present in moderate quantity only. This is, we believe, one explanation (though not the chief) of the complaint made by the dairy farmer that the appearance of the clover bloom coincides with a rapid fall in milk yield. A permanent pasture covered with clover flowers is as a rule a pasture that has been overgrazed earlier in the season. It is no longer highly productive; it is a paradise for bees but no place for a hungry cow.

Laxativeness.—Like every other herbage plant, its composition varies at different stages of growth; but it is, at all times, amongst the most succulent of pasture plants. Milton, at Aberystwyth, has recently determined the dry matter content of various species of herbage, and the following figures, relating to plants from a rotationally grazed pasture, may appropriately be cited:—

	<i>Dry Matter (percentage)</i>		
	<i>May</i>	<i>June</i>	<i>July</i>
Perennial Rye Grass ..	17	27	19
Agrostis ..	24	38	25
White White Clover ..	15	20	16

Normally, wild white makes its most rapid growth in June and early July; and, in temporary leys, it may, at that time of year, owing to its abundance and succulence, cause severe scouring in cattle and lambs.

An instance came within our notice in the Border country this year. Prolonged east winds retarded early growth, and leys were grazed bare by the end of May. Rain in June

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encouraged rapid growth, but the grasses, punished by early grazing, were unable to respond and the wild white clover ran riot. By July, the latter had formed a dense growth of such luscious material that even dairy cattle grazing thereon were severely upset.

As a rule, laxativeness is no deterrent to milk production—the peak of production indeed occurs on young grass. It would be a mistake, however, to suppose that cows necessarily benefit from the purge—possibly the marked fall in yields that always occurs in June and July is a measure of the injury the animals have suffered earlier on. Feeding animals often lose weight on spring grass; on no really laxative diet do they put on good live weight increases; still less do they kill well on such rations. In some feeding areas, farmers deliberately allow grasses such as cocksfoot and timothy to develop to a somewhat fibrous condition in order to check the natural laxativeness of rich temporary leys.

Control.—Plainly, successful ley management does not begin and end in encouraging clovers. Wild white clover, like other species, must be controlled. It can be encouraged in any pasture by hard grazing in the early months of the year. Conversely, it can be held in check by light grazing or by shutting up for hay. At Reaseheath, we have produced from the same seeds mixtures the widest extremes in sward by simple variations in systems of management. To a great extent, wild white can be controlled also by the seeds sown along with it in a ley. Indigenous strains of rye grass tend to limit its growth markedly. It runs particularly well in double harness with rough stalked meadow grass.

Annual Meadow Grass.—If it is permissible to grow lyrical in praise of the Benjamin among clovers, it is difficult to regard the smallest *Poa* with comfort. Until recent years, it was of no account in farming—an irritating little weed in garden paths, perhaps, but of no economic importance. Since the advent of intensive methods of grass management, it has become a serious pest, particularly in temporary leys—whether owing to the closer grazing that intensive management has induced, or to an affinity between *Poa* and soluble nitrogen compounds, is not at all clear. In our experience, it has latterly proved a formidable obstacle to successful ley establishment. Growing and seeding, as it does, at low temperatures, it creeps insidiously into young

NOTES ON FEEDING

leys during the winter months, wherever and whenever a bare spot appears through the death of other plants.

Abundant wild white clover in the autumn often leads to abundant annual meadow grass in the following spring, for wild white forms but a poor cover in the winter months. In the summer, annual meadow grass reaches maturity rapidly, sheds abundant seed and its withering wiry stems remain—neither cattle nor mowing machine will face them. The only method of control open to the grazier appears to be that of establishing quickly and firmly a dense growth of bigger and more desirable species. Indigenous rye grass is the most valuable suppressor at command, though even this may prove ineffective unless a good “take” is obtained in the seeding year.

The Spangenberg Process.—When a seed germinates, the inactive storage materials within are converted by enzymes into soluble materials, and young roots and shoots are produced therefrom. Since the initial step is apparently a mere chemical change, it is natural to inquire whether the whole process cannot be speeded up by the employment of some chemical activator. Many people have answered this question in the affirmative, various strangely dissimilar substances being credited as activators. Without entering into the vexed question of whether any or all of them really stimulate germination, or merely destroy the moulds which otherwise would check that development, it is sufficient, for present purposes, to note that no method of germination-acceleration by chemical means has yet proved of economic significance.

The Spangenberg process, introduced into this country a couple of years ago in an experimental way and “written up” rather flamboyantly by the popular Press, has a more ambitious object than speeding up germination. It aims at the production of usable fodder from seeds in a few days. The process consists in germinating seeds in a metal cabinet, the seeds being flooded periodically with a nutrient solution. In a trial, conducted at the National Institute for Research in Dairying, maize was found to produce shoots about ten inches long (and, of course, a mass of roots) in as many days. Analyses of the sprouted grain showed that during germination about a quarter of the dry matter—mainly carbohydrate—was lost; the seedlings, however, absorbed some nitrogen and mineral ingredients from the nutrient solution, so that there was a

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net increase in crude protein and in ash. A small amount of vitamin C was also synthesized. In feeding experiments, dry sprouted maize was found to give results consistent with a starch value slightly lower than, and a protein value slightly higher than, that of the original grain. It did not appear to be superior to kale as a source of vitamins A and C.

Denatured Wheat.—Samples of wheat containing a proportion of pink or red grains, now on sale in this country, are arousing a certain amount of interest and suspicion among poultry keepers and other buyers. They are an incidental to the world-wide movement for the stabilization of prices.

For some years, France has endeavoured to dispose of a portion of her increasing surplus as cattle food, the grain being treated in such a manner as to distinguish it readily from millable corn. Some of this corn is now being exported in an effort to liquidate the surplus. According to present information, the supply is likely to be temporary only.

Denaturing may be effected by staining the bulk with methylene blue, by rough grinding and admixture with linseed or earth-nut cake, or by staining 5 per cent. of the grains with Eosin. All the samples we have met with have been treated by the last-named method. Eosin and methylene blue are both innocuous aniline dyes. The risks of injuring animals by the use of denatured corn are therefore negligible.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

		<i>Starch equivalent</i>	<i>Protein equivalent</i>	<i>Per ton</i>
		<i>Per cent.</i>	<i>Per cent.</i>	<i>£ s.</i>
Barley (imported)	.. ..	71	6.2	5 5
Maize	.. ..	78	7.6	4 2
Decorticated ground-nut cake	.. ..	73	41.3	6 12
„ cottonseed cake	.. ..	68	34.7	6 15

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1.25 shillings, and per unit protein equivalent 1.45 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

PRICES OF FEEDING STUFFS

FARM VALUES.

Crop	Starch	Protein	Food value	
	equivalent	equivalent	per ton, on farm	
	Per cent.	Per cent.	£	s.
Wheat	72	9.6	5	4
Oats	60	7.6	4	6
Barley	71	6.2	4	18
Potatoes	18	0.8	1	4
Swedes	7	0.7	0	10
Mangolds	7	0.4	0	9
Beans	66	19.7	5	11
Good meadow hay	37	4.6	2	13
Good oat straw	20	0.9	1	6
Good clover hay	38	7.0	2	18
Vetch and oat silage	13	1.6	0	19
Barley straw	23	0.7	1	10
Wheat straw	13	0.1	0	16
Bean straw	23	1.7	1	11

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu-rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro-tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	5 3	0 8	4 15	72	1 4	0.71	9.6
Barley, Canadian, No. 3 Western ..	5 8	0 7	5 1	71	1 5	0.76	6.2
„ Argentine	5 12½	0 7	5 5	71	1 6	0.80	6.2
„ Danubian	5 2½	0 7	4 15	71	1 4	0.71	6.2
„ Persian	4 18	0 7	4 11	71	1 3	0.67	6.2
Oats, English, white	7 17	0 8	7 9	60	2 6	1.34	7.6
„ „ black and grey	7 13	0 8	7 5	60	2 5	1.29	7.6
„ Scotch, white	8 5	0 8	7 17	60	2 7	1.38	7.6
„ Canadian, No. 2 Western ..	8 0	0 8	7 12	60	2 6	1.34	7.6
„ „ No. 3	6 15½	0 8	6 7	60	2 1	1.12	7.6
„ „ mixed feed	6 13	0 8	6 5	60	2 1	1.12	7.6
Maize, Argentine	4 2	0 6	3 16	78	1 0	0.54	7.6
„ Danubian Gal. Fox	4 5½	0 6	3 19	78	1 0	0.54	7.6
„ Russian	4 5½	0 6	3 19	78	1 0	0.54	7.6
„ South African	4 7½	0 6	4 1	78	1 0	0.54	7.6
Peas, Indian	8 15½	0 14	8 1	69	2 4	1.25	18.1
„ Japanese	13 0½	0 14	12 6	69	3 7	1.92	18.1
Dari	6 10½	0 7	6 3	74	1 8	0.89	7.2
Milling offals—Bran, British ..	4 17	0 14	4 3	43	1 11	1.03	9.9
„ „ broad	5 2	0 14	4 8	43	2 1	1.12	10
Middlings, fine, imported ..	5 17	0 12	5 5	69	1 6	0.80	12.1
Weatings†	5 17	0 13	5 4	56	1 10	0.98	10.7
„ Superfine†	6 10	0 12	5 18	69	1 9	0.94	12.1
Pollards, imported	5 5	0 13	4 12	50	1 10	0.98	11

Continued on next page

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Meal, barley	6 12	0 7	6 5	71	1 9	0.94	6.2
" " grade II	5 17	0 7	5 10	71	1 7	0.85	6.2
" maize	4 12	0 6	4 6	78	1 1	0.58	7.6
" " South African	4 7	0 6	4 1	78	1 0	0.54	7.6
" " germ	5 0	0 10	4 10	79	1 2	0.62	8.3
" locust bean	7 10	0 5	7 5	71	2 1	1.12	3.6
" bean	8 5	0 16	7 9	66	2 3	1.21	19.7
" fish	13 15	2 0	11 15	59	4 0	2.14	53
Maize, cooked, flaked	5 5	0 6	4 19	84	1 2	0.62	9.2
" gluten feed	5 10	0 12	4 18	76	1 3	0.67	19.2
Linseed cake, English, 12% oil ..	8 2	0 19	7 3	74	1 11	1.03	24.6
" " " 9% " ..	7 15	0 19	6 16	74	1 10	0.98	24.6
" " " 8% " ..	7 10	0 19	6 11	74	1 9	0.94	24.6
" " " 6% " ..	7 15½	0 19	6 16	74	1 10	0.98	24.6
Soya-bean cake, 5½% oil	7 10½	1 6	6 4	69	1 10	0.98	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 12	0 16	3 16	42	1 10	0.98	17.3
" " Egyptian, 4½% "	4 0	0 16	3 4	42	1 6	0.80	17.3
" " decorticated, 7% "	6 15	1 6	5 9	68	1 7	0.85	34.7
" meal, decorticated, 7% "	6 12	1 6	5 6	68	1 7	0.85	34.7
Coconut cake, 6% oil	6 5	0 16	5 9	77	1 5	0.76	16.4
Ground-nut cake, 6.7% oil	6 0*	0 17	5 3	57	1 10	0.98	27.3
" " " decort., 6.7% oil	7 0	1 6	5 14	73	1 7	0.85	41.3
" " " imported decorticated, 6.7% oil	6 5	1 6	4 19	73	1 4	0.71	41.3
Palm-kernel cake, 4½-5½% oil	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " " meal, 4½% oil	6 5†	0 11	5 14	73	1 7	0.85	16.9
" " " meal, 1.2% oil	5 12	0 11	5 1	71	1 5	0.76	16.5
Feeding treacle	5 0	0 7	4 13	51	1 10	0.98	2.7
Brewers' grains, dried ale	4 12	0 10	4 2	48	1 8	0.89	12.5
" " " porter	4 5	0 10	3 15	48	1 7	0.85	12.5
Dried sugar-beet pulp (s)	5 15	0 5	5 10	66	1 8	0.89	5.2

(a) Carriage paid in 5 ton lots. * At Bristol. ‡ At Hull. † At Liverpool.

† In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of July, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19.2 per ton as shown above, the cost of food value per ton is £9 12. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 29.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.09d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N., 7s. 6d.; P₂O₅, 2s. 1d.; K₂O, 2s. 11d.

MISCELLANEOUS NOTES

Official Statistics

THE annual *Guide to Current Official Statistics*, prepared under the auspices of a Permanent Committee of Departmental Statisticians, provides a comprehensive index to the extensive numerical data published each year in the form of official reports, returns and periodicals. Its contents are so arranged that a complete list of sources of information on the subject of a particular inquiry can be compiled in a few minutes. The degree of analysis of the figures, the date and place to which they relate, and the volumes in which they are to be found, are also included. Volume XIII of this indispensable handbook, dealing with statistics published in 1934, is now ready, and can be obtained through any bookseller; or direct from H.M. Stationery Office, at the addresses given on the cover of this JOURNAL, price 1s., post free 1s. 5d.

The Agricultural Index Number

THE general index of prices of agricultural produce for July was 114 (corresponding month of 1911-13=100) or 3 points higher than for June, and the same as a year ago. (If allowance is made for payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act, the July index would be 120.) The increase of 3 points on the month was due mainly to the higher indices recorded for fat cattle, milk and potatoes. Values for eggs and wool advanced during the month, but those for fat sheep and pigs declined.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13=100.)

Month.	1930	1931	1932	1933	1934	1935
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	114
August	135	121	105	105	119	—
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

MISCELLANEOUS NOTES

Grain.—The average price of wheat was again 5s. 6d. per cwt., but as a slight rise occurred in July of the base years the index declined by 1 point to 68. If allowance is made for the deficiency payment under the Wheat Act, 1932, the index would be 111. Oats averaged 7s. 7d. per cwt. and were dearer by 3d., the index showing an increase of 1 point on the month, but barley declined by 5d. to 6s. 7d. per cwt., the index falling from 94 to 88.

Live Stock.—Prices of fat cattle showed a seasonal fall in July, the average for second quality being 9d. lower at 32s. 11d. per live cwt., but as this fall was considerably less than in the base period, the index moved upwards 3 points to 93. Fat sheep prices also declined and the index depreciated by 7 points to 117. Both baconers and porkers were cheaper, the former by 3d. and the later by 7d. per score, while the indices moved downwards by 4 and 6 points, respectively. Dairy cows showed an increase in price of 6s. per head, but store pigs declined by about 1s. per head; these changes were fairly normal in extent, and the index was unaltered for cows, while that for pigs was only 1 point lower. Store cattle and sheep sold at reduced prices as compared with June, but as these reductions were proportionately less than in July, 1911-13, the indices were 2 and 13 points higher respectively.

Dairy and Poultry Produce.—The regional contract price for milk in July was 1d. per gallon more than in June, and the index advanced from 162 to 175. A year ago the index was 168. Butter prices were a little higher than in the previous month, but the index fell 2 points to 87, while cheese, although slightly cheaper, advanced 1 point to 99. Eggs at 1s. 1½d. per dozen were 1d. dearer, and the index was 7 points higher at 114, or 17 points above the figure recorded in July, 1934. Both fowls and ducks were cheaper than in June, but the index for the former was unaltered, whereas that for ducks was 6 points lower.

Other Commodities.—The index for potatoes in July is based upon prices of first earlies, and the level of prices this season so far at 166 is 22 per cent. higher than in July last year. Clover hay was very slightly cheaper than in June, but meadow hay was unaltered in price; the combined index fell by 1 point to 99. Wool appreciated by ½d. per lb. and the index moved upward 1 point to 86.

MISCELLANEOUS NOTES

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity	1933	1934	1935			
	July	July	April	May	June	July
Wheat	81	66	64	67	69	68
Barley	88	98	93	91	94	88
Oats	75	83	98	97	98	99
Fat cattle	98	99	86	89	90	93
" sheep... ..	107	128	141	140	124	117
Bacon pigs	94	105	108	104	105	101
Pork "	93	108	113	106	103	97
Dairy cows	105	104	99	98	100	100
Store cattle	96	85	85	90	92	94
" sheep	87	108	107	105	100	113
" pigs	108	135	122	115	115	114
Eggs	103	97	96	99	107	114
Poultry	126	114	116	125	123	120
Milk	142	168	215	162	162	175
Butter	94	87	89	87	89	87
Cheese	125	96	91	94	98	99
Potatoes	95	136	95	113	137	166
Hay	68	91	99	100	100	99
Wool	72	86	83	83	85	86

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	121	118	119	114	114	111
Fat Cattle... ..	—	—	100	102	104	107
General Index	104	117	126	117	117	120

Midland College Poultry Conference, 1935

THE Twelfth Annual Poultry Conference at the Midland Agricultural College will be held on Tuesday, September 24, 1935, under the Chairmanship of Captain S. W. Clift, President of the National Poultry Council, who will open the proceedings at 10.45 a.m. The morning session will be occupied with papers by Mr. J. H. Prentice ("Some Aspects of Nutrition") and Mr. J. R. Bond ("Grass Land: Its Control and Improvement in Relation to Poultry"), the subsequent discussion being opened, respectively, by Mr. R. B. Shaw and Mr. E. B. Lomax. The afternoon session will open, at 2 p.m., with the presentation of the College Challenge Cup to the winner of the Inter-County Laying Trials, after which papers will be read by Mr. N. Dobson ("Poultry Diseases") and Mr. L. Turnbull

MISCELLANEOUS NOTES

("Marketing Applied to the Poultry Industry"), the respective discussions being opened by Mr. W. M. Golden and Mr. C. C. Mort. The papers will be short to give ample time for discussion. There will also be an inspection of the College poultry plant, main buildings, etc.

All persons interested are cordially invited to attend the Conference, of which full particulars, with arrangements for accommodation, meals, etc., can be obtained from the Principal, Mr. H. G. Robinson, at the College, as above. Nearest station, Kegworth, is within 10 minutes' walk.

A Course of Instruction in Bulb Production

DURING the past few years, the production of bulbs for the dry-bulb trade has been considerably developed in this country. It has now been arranged to hold a three-months' course in bulb production at the Agricultural Institute and Experimental Station, Kirton near Boston, Lincs., where experimental work in this branch of horticulture has been in progress for some years past. The course will begin on Tuesday, October 8, 1935, and finish on Friday, December 20, 1935. The syllabus includes:—the cultivation of bulbs, corms and tubers; bulb production for the dry-bulb trade; the forcing of bulbs in glasshouses and frames; hyacinth propagation; storage of bulbs; pretreatment for forcing and planting; the marketing of bulbs and flowers; soil in relation to bulb growing; rotations; market garden crops in conjunction with bulb growing; manures and manuring; the botany of the bulb; and diseases and pests of bulbs.

Further particulars may be obtained on application to the Principal of the Institute at the address given above.

Agricultural Machinery Testing Committee

THE undermentioned Certificate and Report issued by the Ministry, has been published in pamphlet form:—

No. 56. Dunlop Pneumatic Tractor Tyre Equipment.

The test was carried out by the Institute for Research in Agricultural Engineering, University of Oxford.

Copies of the pamphlet may be obtained price 3d., post free 3½d., through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Foot-and-Mouth Disease.—No outbreaks of foot-and-mouth disease have occurred in Great Britain since June 20 last, and, at the time this issue went to press, no part of the country was subject to Foot-and-Mouth Disease (Infected Area) restrictions.

APPOINTMENTS

Enforcement of Minimum Rates of Wages.—During the month ending August 14, 1935, legal proceedings were taken against eight employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow :—

Committee Area.	Court.	Fines imposed.	Costs allowed.	Arrears of wages ordered.	No. of workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Glamorgan ...	Whitchurch	5 0 0	15 0	29 4 0	3
" ...	Penmaen	10 0	4 0	20 0 0	1
" ...	Llantrisant	1 0 0	—	7 5 5	1
Denbigh ...	Llanrwst ...	1 0 0	1 1 0	6 9 2	1
Salop ...	Church				
	Stretton...	1 0 0	2 6	18 0 0	1
Flint ...	St. Asaph...	2 0	5 0	15 2 3	2
Carnarvon...	Pwllheli ...	10 0	7 0	1 4 0	2*
Oxford ...	Witney ...	—	—	—	1†
		£ 9 2 0	2 14 6	97 4 10	12

*Case of one worker dismissed.

†Dismissed.

WIRELESS TALKS TO FARMERS IN SEPTEMBER

Date	Station	Time	Speaker	Subject
18, 25	National	7.5 p.m.	Professor J. A. Scott Watson	For Farmers Only
18, 25	Midland	6.50 p.m.	Mr. W. B. Thompson	For Midland Farmers
11	West	6.30 p.m.	Various	Down on the Farm (3). A walk round a Devonshire Farm: a relay from Long Ashton
19	Scottish	6.30 p.m.	Mr. John Anderson	First steps in Honey Production
26	"	6.30 p.m.	Mr. R. W. L. McCaig	Talk to Scottish Farmers: Pig Marketing

APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS

ENGLAND

Cheshire.—Mr. N. S. Selkirk has been appointed Assistant Lecturer in Agriculture and Farm Book-keeping.

Devonshire.—Mr. H. F. Burdett has been appointed County Poultry Instructor, *vice* Mr. E. Russell (retired).

Durham.—Mr. T. Dawson has been appointed Temporary Assistant Instructor in Dairying.

PRICES OF ARTIFICIAL MANURES

Gloucestershire.—Mr. K. M. Pearman, B.Sc. (Agric.), N.D.A., and Mr. J. L. Congdon, N.D.A., have been appointed Assistant Instructors in Agriculture.

Hampshire.—Mr. H. Hirst, N.D.A., N.D.D., and Mr. W. P. Strang, N.D.A., N.D.D., have been appointed Assistant County Dairy Officers.

Oxfordshire.—Mr. T. Neil, B.Sc. (Agric.), N.D.A., has been appointed Temporary Assistant to the Agricultural Organizer.

Wiltshire.—Mr. W. A. Scriven, N.D.A., N.D.D., and Mr. J. R. Keyworth have been appointed Temporary Assistant Instructors in Dairying.

Mr. R. D. H. Bridge, N.D.P., has been appointed Instructor in Poultry-keeping, *vice* Mr. H. F. Burdett.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended Aug. 14				
	Bristol	Hull	L'pool	London	Cost per unit at London
Nitrate of soda (N. 15½%) ..	£ 7 12d	£ 7 12d	£ 7 12d	£ 7 12d	s. d. 9 10
„ „ Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 14d	6 14d	6 14d	6 14d	6 6
Calcium cyanamide (N. 20.6%) ..	6 15s	6 15s	6 15s	6 15s	6 7
Kainit (Pot. 14%) ..	3 1	2 15	2 15	2 15	3 11
Potash salts (Pot. 30%) ..	4 13	4 12	4 10	4 8	2 11
„ „ (Pot. 20%) ..	3 18	3 12	3 10	3 12	3 11
Muriate of potash (Pot. 50%) ..	7 13	7 11	7 7	7 5	2 11
Sulphate „ „ (Pot. 48%) ..	8 18	9 1	8 15	8 11	3 7
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19g	2 16g	3 6
„ „ (S.P.A. 13½%) ..	2 15	2 11	2 15g	2 12g	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 10k	6 7	..
Steamed bone-flour (N. 4½%, P.A. 27½-29½%) ..	5 12	5 5	5 5k	5 5	..

Abbreviations ; N. = Nitrogen ; P.A. = Phosphoric Acid ; S.P.A. = Soluble Phosphoric Acid ; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 3-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater ; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 3 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 3 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails ; southern rails 2s. 6d. extra.

h Prices shown are f.o.r. Appley Bridge.

NOTICES OF BOOKS

The Encyclopædia of Poultry. By J. Stephen Hicks. 2 vols. Pp. xiv + 662. Illus. (London: The Waverley Book Co. Ltd. 1935. Price 35s.)

Scientific research and investigation into the various problems of breeding, feeding, disease and management of poultry have made possible the considerable progress that may be observed in the poultry industry to-day. Fresh knowledge gained in the various fields of investigation is very often followed by a modification or complete change in production technique. In recent years increasing attention has been paid by poultry farmers to highly specialized and intensive methods of chick-rearing, and egg and table poultry production. Some of these methods, such as battery brooding and hen batteries, have carried the farmer rapidly away from the earlier and more natural systems until many farms now assume the characteristics of a factory, not only in the very large numbers of stock that they carry but also in their equipment and organization.

Mr. Hicks in his capacity as editor of this new edition of *The Encyclopædia of Poultry* has made it his principal aim to provide poultry keepers, both large and small, with up-to-date knowledge of the latest practices and a comprehensive guide to the numerous branches of a very wide subject. It is not to be expected that an editor can combine in his own person specialized knowledge of all phases of the industry, nor does he claim to do so. Nevertheless these two volumes contain much information, both scientific and practical, that should be of value to those interested in commercial egg and poultry production. The subject-matter, which has been arranged alphabetically to facilitate reference, is well presented in clear and simple language, and the printing and illustrations are of a high standard. Apart from the limitations necessarily imposed in compiling a work of this nature the Encyclopædia should be a useful addition to the poultryman's library.

The Application of Absorption Spectra to the Study of Vitamins and Hormones. By R. A. Morton, D.Sc., Ph.D., F.I.C. Pp. 70. (London: Adam Hilger, Ltd. 1935. Price 10s.)

This monograph contains a detailed description of the present-day application of spectroscopic methods to the identification and estimation of the known vitamins. There is also a short summary of the available similar information regarding oestrogenic hormones, thyroxin, insulin and adrenaline.

A whole chapter is devoted to each of the vitamins D, A, B₁, B₂ and E. For each vitamin a resumé is given of the most recent researches on the chemical constitution of the purest preparations obtained, with details of the chemical and physical properties and of the approved methods for study of the characteristic absorption spectra. In the case of vitamins D and A, the respective provitamins, ergosterol and the carotenes, are also fully discussed, and a particularly valuable Table is given in which are collected the details of the optical and physical properties of a large series of carotenoids and related substances.

A full description is given of the estimation of vitamin A by measurement of the extinction coefficient at $328m\mu$ together with the methods appropriate for cod-liver oils and vitamin A concentrates, respectively, and the relation of these results to those biological tests.

The book is fully illustrated with reproductions of absorption spectra and of the curves derived therefrom. It will be welcomed by workers in this field as a laboratory hand book providing, in a convenient form, a collection of valuable data not to be found elsewhere. The subject matter is much condensed and the monograph is therefore not suited to the general student, for whom it is obviously not intended.

NOTICES OF BOOKS

Proceedings of the Third International Conference of Agricultural Economists. Ed. by J. P. Maxton. Pp. xi + 498. (London: Humphrey Milford, Oxford University Press. 1935. Price 17s. 6d.)

Anyone interested in agricultural economics, particularly in the recent development of agricultural policy at home and abroad, would be well advised to read the papers that this volume contains. Their subjects are grouped in four sections—National Policies in Agriculture; Social and Economic Aspects of Farm Organization; Population Growth and Agriculture; and International Policies Relating to Agriculture. It is explained in the Introduction that papers given at the Conference were mainly directed to the study of national and international policies, and that not all the countries could be included; but the countries included are representative, in many respects, of certain types, such as "deficit" countries with intensive farming methods; "deficit" countries approaching self-sufficiency; "surplus" countries with specialized systems of production; and so forth.

The papers read by economists from the various countries represented at the Conference form a body of information that merits very careful consideration, not only by those engaged in technical research work, but, more particularly, by those concerned, directly or indirectly, with the formulation of agricultural policy.

The labour of editing papers from so many different countries must have been exacting and difficult, and Mr. Maxton is to be congratulated on the very successful result of his efforts.

The Agricultural Marketing Acts. By H. M. Conacher. Preface by Sir Robert Greig, LL.D. Pp. vi + 192. (Edinburgh: W. Green & Son, Ltd. 1935. Price 10s.)

This book provides a conspectus of the Marketing Acts, together with appropriate explanations and comments. The 1931 Act has been printed, together with its amendments, as a composite whole; and is followed by the two Acts of 1933. The procedure for submission and approval of schemes, the effect of marketing schemes on contracts, etc., are discussed; and there are appendixes containing a list of the Statutory Rules and Orders made under the Acts, a brief description of each of the marketing schemes now in operation, a discussion of the provisions of the Acts relating to offences and penalties, and those provisions of the Milk Act, 1934, which affect the powers of milk marketing boards. A useful index is also provided.

The numerous explanatory notes can claim authority by reason of the author's official position in the Scottish Department of Agriculture at the time when the Marketing Acts were being framed, and in the early days of the operation of marketing schemes. The volume can be recommended as a valuable book of reference on Marketing Act matters.

The Pig-breeders' Annual, 1935. Vol. XV. Ed. by A. Hobson. Pp. 180. Illust. (London: National Pig-breeders' Association, Victoria House, Southampton Row, W.C.1. Price 2s. 6d.)

Practically all aspects of pig production receive attention in the latest issue of this annual. In a prefatory note, Viscount Lymington outlines the two main concerns of the breeder as financial prosperity and the physical fitness of his stock. Among the subjects discussed are hereditary factors, housing, milk and milk products in feeding, the tuberculin test, carcass competitions, and by-products. An interesting feature is a series of photographic illustrations of the breeds of various countries, exemplifying some strong contrasts, e.g., the long-sided pigs of Britain and Scandinavia; the short, fat, curly-coated swine of Hungary; and the land-hog of China. Summarized reports of feeding and other experiments, and of research work, conducted during the past year, also detailed statistical and nutritional tables, are included in this useful publication.

NOTICES OF BOOKS

Considerations on the Present Evolution of Agricultural Protectionism. League of Nations, Economic Committee, Geneva, 1935. Official Number C.178.M.97.1935.IIB. Pp. 49. (London: Allen & Unwin. 1935. Price 1s. 6d.)

In this Report the Economic Committee of the League of Nations pleads for a return to more moderate forms of agricultural protection. Agricultural protection, as the world has experienced it in the past few years, the Committee regards as the result of "a defensive reaction, often violent and incoherent, but in the main comprehensible, against the dangers of an unprecedented economic depression." Facts are to hand which prove that "this exaggerated policy of protectionism, spreading from one country to another, is tending to prolong the depression which it was designed to combat and to prejudice the interests of the classes that it aimed at protecting." The Report, however, is not by any means a Free-Trade document. The Committee fully recognizes that the social and political importance of the peasant or farming classes in many countries makes free trade impracticable. The matter is summed up with the observation: "Kept within reasonable limits, as practised before the War, agricultural protectionism represents indeed only one form—possibly the most important—of voluntary re-distribution of national wealth to which it is hardly fair to apply the abstract standards of pure economic criticism." The point which the Report emphasizes is the necessity of keeping protection within reasonable limits if it is not to do more harm than good.

Several of the arguments commonly adduced in support of agricultural protection are reviewed. The "scissors" argument—the desirability of restoring the relationship between industrial and agricultural prices—the Committee would apparently only accept with reservations, though its views are not stated very clearly. Regarding the desirability of protecting agriculture in the interests of national defence it points out that none of the belligerent countries during the last War was able to keep on the land the labour necessary to produce the quantity of foodstuffs which it had produced in time of peace. The Report lays great stress on the danger that over-protection will lead to over-production. "Directly over-production takes root in a country, the whole machinery of protection, set up and maintained at such cost, ceases to function. Prices drop and it becomes necessary to have recourse to increasingly burdensome and increasingly artificial methods (creation of stocks, carrying forward, fixing of minimum prices, various more or less highly developed forms of planned economy, etc.), which, as a rule, simply aggravate the situation and increase the discontent of the agricultural producer." Further, the closing of the import market for foodstuffs in industrial countries reacts in turn upon the ability of the agricultural countries to purchase the manufactured goods which the industrial countries are anxious to export. The Committee concludes that "the maintenance of a normal current of agricultural imports on the part of the industrial countries is in keeping with the true interests of the nation as a whole and of the agricultural producers in particular."

Of greater interest to the economist than the report itself are the two memoranda, printed as Annexes, which formed the basis of the Committee's discussions. The first is entitled "Agrarian Protection in Europe in the Post-war Period" and was submitted to the Committee by Sir Frederick Leith-Ross, the United Kingdom member. It contains a survey of the development of protection in leading European countries in recent years, together with statistics of trade, production and consumption of leading agricultural products, and an attempt to estimate the effects of the protectionist movement on the position of the overseas agricultural countries. The second is a note on "The General Evolution of Agriculture at the end of the Nineteenth Century in relation to the Growth of Agricultural Protection," which describes

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the first impact of competition from the new countries overseas on European agriculture during the 'seventies and forms an instructive historical introduction to the present situation.

One misprint that has found its way into Sir Frederick Leith-Ross's Memorandum may be corrected. The duty on foreign wheat entering this country is not 5s. 6d. per cwt. but 5-6 pence.

The Agricultural Marketing Acts and Schemes. By N. E. Mustoe, M.A., LL.B. Pp. xv + 440. (London: The Estates Gazette, Ltd. 1935. Price 12s. 6d.)

This publication, by a barrister-at-law, is a valuable work of reference on the legislative enactments relating to the marketing of agricultural produce in England and Wales. It brings together in a single volume statutes, orders and regulations, as well as cases bearing thereon. The text of the Agricultural Marketing Acts and of the marketing schemes in force is given, together with the Regulations made under the Acts. It reproduces also the Wheat Act, 1932, and Regulations thereunder, with the by-laws of the Wheat Commission, and the Cattle Industry (Emergency Provisions) Act, 1934, and relative regulations and orders.

Abundant cross references and annotations are made, and the bearing of recent court decisions on the interpretation of the sections of the Acts concerned is indicated. A resumé of the Acts in plain language is given in the introduction. The work forms a notable addition to the literature dealing with agricultural marketing.

Primitive Land Plants, also known as the Archegoniatae. By F. O. Bower, Sc.D., LL.D., F.R.S. Pp. xiv + 658 and 449 Figs. (London: Macmillan & Co., Ltd. 1935. Price 30s.)

Professor Bower's new book is intended to replace the author's *Origin of a Land Flora* which is now 27 years old. Fresh discoveries and theories have made such a replacement necessary, though the new work is entirely new and is not to be regarded as a second edition of the *Origin*.

The book is divided into two main parts. The first 23 chapters are mainly descriptive and deal with the several classes of the Archegoniatae. The second part of eight chapters consists of a series of discussions on various aspects of the Archegoniatae, e.g., "Prothallus and Gametangia," "Axes and Leaves." It is this second part, of course, that holds much of the interest of the book.

The plan of the work and its abundant illustrations make it quite suitable as a text-book for students, even more so perhaps than did its distinguished predecessor, the *Origin*.

One of the most striking differences between the two works of Professor Bower is the important part played in the new book by the modern outlook on size and form. Such an important factor was ignored in 1908 and it will be remembered that it was Professor Bower himself who, in another work, *Size and Form in Plants*, drew attention to the important bearing of increasing bulk on the complexity of plant form.

That the work is interesting goes without saying. It is written in a style that at once charms and holds the attention, a style that has been approached only in the work of the late D. H. Scott, to whom the book is very fittingly dedicated.

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The International Congress of Soil Science

It was indicated in a note in the issue of this JOURNAL for April last, that the Third International Congress of Soil Science was to be held in Oxford, England, from July 30 to August 7 of this year, under the presidency of Sir John Russell, D.Sc., F.R.S. The Congress was duly held, and two bulky volumes of the transactions of the Congress have now been issued and a third will follow. Volume I contains the Commission Papers and Volume II Plenary Session Papers and the Presidential Address.* These collections of papers, covering many aspects of soil science, give a comprehensive survey of the present state of that science.

As the President said in his address: "In its early days, soil science as an integral part of agricultural chemistry maintained close contact with practical agriculture. Soil workers were expected to advise about cultivation, manuring and general soil management. With the later development of soil science as an independent subject, this connexion with agriculture was weakened for a time, but pressure of economic circumstances has compelled many soil workers to get back to practical agricultural problems and has required all of them to justify the claim that soil science deserves to be pursued not only because of its intellectual value, but because it can render great help to agriculture." The papers presented by the various Commissions are sufficient evidence that the period when soil science had to some extent severed its connexion with

* Transactions of the Third International Congress of Soil Science: Vol. I, Commission Papers, price 28s. ; Vol. II, Plenary Session Papers and the Presidential Address, price 13s. (London: Thos. Murby & Co., 1935.)

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practical agriculture is now over, and that the findings of the very large number of workers engaged upon different branches of the subject will, in fact, enable man still further to improve his methods of dealing with the soil in order to stimulate plant life.

Diseases of Animals in 1934

THE Report of Proceedings under the Diseases of Animals Acts for the year 1934, recently issued,* records the continued freedom of Great Britain from cattle plague (rinderpest), contagious pleuro-pneumonia, sheep-pox, rabies, epizootic lymphangitis, glanders and dourine. There were 79 outbreaks of foot-and-mouth disease, of which 77 occurred during the last five months of the year, 68 being confirmed after October 19. There were no outbreaks during five months of the year, viz., January, February, April, June and July. There were 20 new centres of infection during 1934, distributed among 13 English counties and 2 Welsh counties, and no conclusive proof of connexion between any of these centres could be traced. In dealing with this disease the Ministry adhered to its established policy known as the slaughter policy, which involves the immediate compulsory slaughter of all animals affected with the disease and of those directly exposed to infection.

There was a considerable increase in the number of outbreaks of swine fever as compared with the two preceding years; also an increase (33 per cent.) in the number of outbreaks of anthrax; but a decrease (13 per cent.) in the number of outbreaks of parasitic mange of equine animals. The number of outbreaks of sheep scab again showed a heavy increase (18 per cent.), principally owing to the heavy infection that has persisted since 1933 in the counties bordering the Pennine Range. The Report describes the intensive campaign undertaken for the control and eradication of this disease. In Wales there was a decrease of 13 outbreaks of sheep scab, but in Scotland an increase of 30, from 32 to 62, of which 52 occurred in the Outer Hebrides.

The Report also gives the usual details showing the results of the administration of the Tuberculosis Order of

* Report of Proceedings under the Diseases of Animals Acts for the Year 1934: H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 1s. 6d. (post free 1s. 8d.).

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1925 by Local Authorities. The number of cattle examined by veterinary inspectors, under the provisions of the Order, rose from 350,550 in 1933 to 393,343 in 1934, and the number of cattle slaughtered increased by 1,095 to 22,180, the highest figure yet recorded. These yearly increases, however, cannot be regarded as evidence of the increased incidence of tuberculosis, but merely as evidence of greater activity on the part of the local authorities under the Milk and Dairies Acts. This part of the Report contains a reference to the work of the Gowland Hopkins Committee and the initiation of the Tuberculosis (Attested Herds) Scheme under Section 9 of the Milk Act, 1934.

Part II of the Report deals with the measures taken to prevent the introduction and spread of disease in this country, and describes the general preventive Orders in force. Particulars are given of the animals imported from Ireland and other countries, and of the instances of disease found in imported animals, which were limited to four cases of scheduled forms of bovine tuberculosis and 61 cases of sheep scab—14 from Northern Ireland and 47 from the Irish Free State.

Part III describes the administration of the measures for the protection of animals from unnecessary suffering during transit by land and sea. All the 19 vessels engaged in the trade of carrying Canadian cattle to this country were inspected and found to be in order. The records show that the percentage of casualties among the large numbers of animals carried continues at a very low figure.

Part IV deals with the certification of animals and animal products for export, in accordance with the regulations of the importing countries, in so far as such certification must be made under the Ministry's authority. Particulars in regard to the working of the London Quarantine Station for exported pedigree stock are also given.

Part V reviews the diagnostic and research work carried out at the Ministry's Veterinary Laboratory and Research Institute at Weybridge, including also the preparation and issue of vaccines for animals and poultry, and the conducting of agglutination tests of poultry.

A "Miscellaneous" section of the Report, Part VI, includes a reference to the annual meeting of the International Veterinary Bureau in Paris, the International Veterinary Conventions agreed at Geneva and the International Veterinary Congress at New York.

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The Appendixes to the Report contain the usual statistical tables of scheduled animal diseases confirmed in each county in Great Britain, the live-stock population, animals imported and exported, numbers and breeds of stock exported with the Ministry's certificates, and the incidence of certain animal diseases in European countries.

Poultry and Rabbit Conferences at Harper Adams College

ONCE again the annual Harper Adams Poultry Conference has made a very wide appeal to poultry breeders, as was indicated when nearly 200 breeders from all parts of the British Isles assembled at the College for the nineteenth Conference from August 13 to 15.

The outstanding feature of a varied programme was the address on the Marketing of Eggs, by Mr. F. N. Blundell, Chairman of the Egg and Poultry Marketing Reorganization Commission, the address being followed by a long and keen discussion. Other matters that came under review at different stages of the Conference were the problem of the assessment of the interior quality of the egg, practical work and experiments relating to table poultry, the work of the National Official Pedigree Breeding Station, the nutrition experimental work in Northern Ireland, respiratory diseases of the fowl with special reference of laryngo-tracheitis, the mortality records of the College Laying Trials, and the applications of electricity on the poultry farm. The interests of the duck breeder were covered by a special session at which addresses were given on the breeding and management of ducks for egg production and for table purposes.

The Conference was supplemented by inspections of the National Institute of Poultry Husbandry and the College Laying Trials. During these inspections there were also demonstrations of several motor grass mowers suitable for poultry farms.

The Annual Rabbit Conference is as yet but a modest one-day affair, but is steadily gaining ground, and the seventh Conference held on Saturday, August 17, attracted a larger attendance than usual. The addresses dealt with breeding problems and diseases of the rabbit, and the marketing of rabbits for table. Other features included the inspection of the Rabbit Department of the Institute and a competitive exhibit of rabbit pens and wool samples.

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Farm and Machine*

IN the July, 1934, issue of this JOURNAL a notice of the first volume of *Farm and Machine* appeared. This notice showed very clearly the intimate connexion between the work that is being done at the Institute for Research in Agricultural Engineering and that of the practical farmer. This second volume will appeal equally with the first to the everyday reader who is confronted with the numerous problems arising out of the increase of mechanization.

The volume describes the work of the Institute and, like its predecessor, includes a number of papers which, while being very instructive, are perhaps too slight to justify separate publication. The pages entitled "Tractor Facts and Fancies" discuss in simple language the practical use of the tractor on the farm and the means that may be adopted to compare the work of one type with that of another in its relation to the particular work that a farmer may be contemplating. The article on the Tractor Dynamometer, though of importance, will perhaps be of less direct interest to the average reader, for the use of the dynamometer is, as the writer points out, rather outside the scope of the ordinary farmer. The maintenance of the Diesel engine, which is a comparatively new development, is a subject on which information was very necessary and the simplicity of the instructions contained in this article will make it of very great value to users. There is also an informative article on the market-garden tractor.

Now that the "grid" is in operation, farmers in many areas are considering the use of electricity for one purpose or another, and perhaps the most important factor in their consideration is the tariff. Mr. Cameron Brown's discussion of this subject is therefore of immediate interest. The use of apparatus for spraying and dusting arable crops is increasing, and the progress made during 1934 is discussed by Mr. Macdowall. Two short essays by authors who are not on the staff of the Institute are included. The first, by Mr. Nicholson of the Cambridge School of Agriculture, throws new light on the long-debated problem of the action of field drains, which the Institute has been investigating

* *Farm and Machine*, Vol. II: Report of the Institute for Research in Agricultural Engineering, University of Oxford, for the year ended September, 1934, and miscellaneous papers on agricultural engineering. Oxford: The University Press, price 2s. 6d., or 2s. 8d. from the Institute.

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for some time from another standpoint. The second, by Mr. Dunstan Skilbeck of the Oxford School of Rural Economy, on the progress of the fully mechanized farm recently started by St. John's College at Long Wittenham, of which he is the resident manager, continues the story begun in Vol. I of *Farm and Machine* by Professor J. A. S. Watson, of a profitable experiment. The Director contributes an instructive article on grain-cleaning equipment for farms, and the work on sugar-beet harvesting which has been carried out is discussed in detail by Mr. Newman, the volume being completed by a description of implements for regenerating grass land, a very important modern development of mechanization, and a practical data sheet that provides a useful guide in making a choice between various types of tractor.

Commercial Egg Farming

IMMEDIATELY before the Great War there were somewhat less than thirty million fowls on agricultural holdings in England and Wales. During the War the number fell. By 1924, however, the pre-war position had been fully recovered, and by 1933, only a decade later, the number of farm poultry had actually doubled. This remarkable expansion, in the face of a persistently adverse trend of selling prices, and during a period when the field for the investment of capital in productive enterprises was steadily narrowing, is an outstanding feature of post-war developments in British agriculture. Unlike other farming enterprises, the poultry industry has grown without the assistance of tariffs, subsidies, or marketing schemes, and its success represents a notable contribution to the general problem of agricultural relief which has commanded so much attention in national affairs.

The equipment required by this large industry has given a great deal of employment to labour and capital in ancillary industries. As a whole, therefore, the poultry industry is one of the leading agricultural enterprises. Further, the technical problems of feeding, breeding, disease control, housing, etc., have required solution. The results of this work are mainly of interest only to the poultryman, the research worker and the adviser, but the growth of the industry has aroused interest in many others

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who wish to use the industry for the relief of industrial unemployment. Unfortunately, the present economic position of the poultry farmer is causing a good deal of concern. The fall in egg and poultry prices, coupled with the recent rise in the prices of feeding stuffs—the most important item of costs—have seriously affected poultry farming profits.

There are, however, very few specific data available respecting the economics of the industry. The results of the joint investigation carried out by the Agricultural Advisory Economics Branches at Armstrong College, Newcastle-on-Tyne, and at Harper Adams Agricultural College, Newport, Salop, during the years 1931-34, just published,* is, therefore, a welcome contribution to the subject.

The report shows that general farm flocks enjoy an economic advantage because they require less capital outlay, since existing buildings and equipment can be used. The general farmer, however, is showing an increased tendency to abandon the use of makeshift accommodation in favour of properly designed and constructed houses and other appliances. No attempt has, however, been made to compare the economic advantages of intensive, semi-intensive and extensive methods of housing, although the investigators believe that economic success is not so much a question of which system is followed as of how well the system adopted is managed.

As the writers point out, the growth of the industry in such a short time has necessarily heavily increased the personnel engaged in it, with the consequence that poultry farmers generally seem very open to receive suggestions and are willing to try anything once. The result is that the way is opened to ill-considered changes in methods and management, and possible exploitation. Moreover, on the smaller scale farms there is a lack of skilled labour, which is one of the factors of management that is most important. Instead of being properly planned, many poultry farms have developed in a very haphazard way, and the open-mindedness (or lack of knowledge) of the farmers has led to fluctuations in system and management that are not always advantageous. Throughout the report the investi-

* *Commercial Egg Farming. An Economic Study of Representative Enterprises in the North and West, 1931-1934.* Obtainable from Wilding & Son, Ltd., 33, Castle Street, Shrewsbury, or any bookseller. Price 2s. (2s. 2d. post free).

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gators lay heavy stress upon the necessity for skilled management. They acknowledge that the degree of development that has been so rapid in the last 10 years implies a high degree of alertness and business acumen on the part of individual poultry-keepers, and might also suggest a corresponding degree of skill and efficiency. The facts presented in the report, however, support the view that the internal efficiency of many poultry enterprises leaves much to be desired. No other branch of farming displays such a wide diversity in its personnel, and there is no doubt that many people are encouraged to take up poultry farming without a proper appreciation of its speculative nature.

This study makes no claim to be a complete picture of poultry farming and its problems. Its limited scope is freely admitted. It does, however, present an unbiased opinion of impartial observers who have been engaged in the collection and examination of intimate information from egg farmers over a period of more than four years, and whose opinions are strengthened by close personal contacts over a much wider field than is covered by the actual farms studied.

Apart from the general observations that have been briefly summarized above, the investigators have provided a complete analysis of the tabular information that forms such an important part of their work. Poultry farmers must themselves study these figures if they wish to appreciate the full significance of the work that has been done.

Further work of this nature is required if a solution is to be found for the many difficulties that at present confront those who are engaged in this branch of farming.

Dairy Produce Supplies in 1934

THIS annual review of supplies of dairy produce, poultry and pig products* prepared by the Intelligence Branch of the Imperial Economic Committee maintains the same high standard of previous years. It contains a wealth of statistical data in tabular and graphical form relating to 1934 and previous years, and provides a source of reference

* *Dairy Produce Supplies in 1934*. Obtainable from H.M. Stationery Office at the addresses given on the cover of this JOURNAL, price 1s. 6d., post free 1s. 9d.

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for all who are interested in these commodities or with this part of our food supply.

The main body of the review deals with three aspects of the trade: first, with the general position of the United Kingdom as an importer of dairy, poultry and pig products; second, with the supplies and prices of the individual commodities; and, third, with the facts relating to the trade in dairy products of the principal countries of supply. In addition, there are appendices dealing with import duties and quantitative regulation of imports in the United Kingdom; with the operation of the Milk Marketing and Bacon Marketing Schemes in this country, with special reference to the utilization of milk and the supplies of bacon respectively; with the foreign trade agreements as they affect dairy produce; and with legislation affecting dairy produce in certain important exporting countries.

The United Kingdom, for many years, has been the most important market for dairy and allied produce, and again increased its share of the world's imports in 1934. The value of butter imports exceeded that of any other food commodity, and bacon displaced wheat as the second most important item. For many commodities, the proportion imported from Empire countries was greater in 1934 than in the previous year.

The total quantity of butter entering into world trade increased by 6 per cent. in 1934, but imports into the United Kingdom increased by nearly 10 per cent. Values were lower, however, and the larger import cost £1,000,000 less than in 1933. As a result of the increased imported supplies during recent years, the *per capita* consumption of butter has increased by nearly 35 per cent. since 1930, and in 1934 is estimated to have been 25.2 lb. In contrast with the expansion of the trade in butter, the world trade in cheese has tended to decline in recent years and imports into this country have fluctuated around 3,000,000 cwt. The bulk of the supply (70 per cent.) was imported from New Zealand. Prices continued to fall in 1934, but not so markedly as in the previous year. Imports of eggs in shell showed a slight recovery. A useful addition to the statistics of egg imports is a table showing the imports classified on a weight basis. Egg prices declined very slightly in 1934 and on the average were a fraction of a penny per dozen cheaper than in 1933. Imported supplies of bacon in 1934 amounted to 7,600,000 cwt. and were one and a half million cwt. lower

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than in 1933. Denmark remained the most important source of supply, but a significant feature was the increase in Empire supplies, particularly from Canada. The trend of bacon prices, which has been rising since 1932, continued to rise during 1934.

The notes relating to the chief countries of supply are of considerable interest. The price effects of trade restrictions and protective policies in respect of dairy produce in certain of the European countries are well illustrated by a table showing the price of butter in those countries; for example, the average price of finest New Zealand butter in London in 1934 was 73s. 3d. per cwt., and in Paris the sterling equivalent of the price of butter was 208s. 9d. per cwt., or nearly three times the London price.

Sampling Observations on Wheat, 1934-35: Report for Fourth Quarter

THE large table (p. 644) gives a summary of the fourth quarter's observations. These include ear density and ear height on the last observation before harvest, the date at which the crop was fit for cutting and the yields of grain and straw at harvest.

The mean yield of the two standard varieties over the seven comparable stations is shown below for each of the three years during which the full scheme of observations has been in progress.

<i>Grain (cwt. per acre).</i>			<i>Straw (cwt. per acre).</i>		
1933	1934	1935	1933	1934	1935
24.9	34.4	27.9	46.9	52.7	52.7

The yield of grain is intermediate between those of 1934 and 1933, the present season, as was expected, not having proved as good as last year. The yield of straw is practically the same as last year, grain-straw ratios being smaller this year than last at almost all stations, and generally about the same as in 1933. The highest yields of grain were 46 cwt. per acre for Squarehead's Master and 48 cwt. for Yeoman, both recorded at Plumpton.

Apart from Wye, at which Squarehead's Master suffered rather badly from Take-all, there was little difference between the yields of grain of the two standard varieties, the only significant difference being that in favour of Yeoman at Boghall. Squarehead's Master gave higher yields of straw at seven centres, but none of the differences

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was significant. At Plumpton, Yeoman had a significantly higher yield of straw.

Four stations also grew a local variety. These varieties gave significantly higher yields than the standard varieties at Seale-Hayne and Woburn.

The dates at which the crop was fit for cutting ranged from July 25 at Seale-Hayne to August 27 at Boghall, and were on the average about the same as last year. As in previous years, Squarehead's Master was ready slightly earlier than Yeoman.

At the last observation before harvest Squarehead's Master was the tallest variety at all stations, the average difference in height being 10.5 cm., while Yeoman had the highest ear density. There was again no apparent connexion between ear number on this date and final yield. The ear numbers were higher than last year at 6 of the 8 comparable stations.

Newport and Rothamsted again made two sets of observations on dry matter, these being about a month and a fortnight before harvest respectively. The results are shown below:—

DRY MATTER OBSERVATIONS

Station and Variety	Date	Dry matter (cwt. per acre)	Per- centage dry matter	Date	Dry matter (cwt. per acre)	Per- centage dry matter	Yields (cwt. per acre)	
							Grain	Straw
<i>Newport</i>								
S.H.M.*	July 12	73.7	39.1	July 23	84.4	49.3	40.6	63.5
Yeoman	July 12	67.8	41.3	July 23	76.3	49.6	39.4	61.7
S.E. of diff.	—	± 4.09	± 2.23	—	± 5.38	± 0.493	—	—
<i>Rotham- sted</i>								
S.H.M.	July 8-9	73.8	37.1	J'ly 22-23	88.7	49.0	30.6	79.9
Yeoman	July 8-9	69.2	37.7	J'ly 22-23	77.0	47.1	38.8	77.8
Victor	July 8-9	73.7	35.6	J'ly 22-23	96.0	46.5	37.3	84.4
S.E. of diff.	—	± 4.82	± 0.502	—	± 4.94	± 0.521	—	—

* Squarehead's Master.

The final dry matter observations do not give as good an approximation to the total yield of grain and straw at harvest as in previous years, the actual yield being higher for both stations by about 25 cwt. per acre. The dry matter showed in all cases a considerable increase from the earlier observation to the later.

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SAMPLING OBSERVATIONS ON WHEAT. 1934-35, FOURTH QUARTER

Station	Variety	Last observations before harvest			Date fit for cutting	Date of harvest	Distance between rows ins.	Yields and standard errors of differences in cwt. per acre		
		Date	Ear Density per 32m.	Ear height cm.				Grain	S.E. of diff.	Straw
LONG SUTTON Hampshire	S.H.M. § Yeoman Wilhelmina	July 22	979	86.9	July 31	Aug. 3	6	10.9		18.1
		July 22	1209	79.0	Aug. 1	Aug. 3	6	10.6	± 0.950	16.4
		July 22	759	85.4	July 31	Aug. 3	6	10.4		14.3
SEALE-HAYNE Devonshire	S.H.M. Yeoman Carton's No. 60	July 23	1759	109.8	July 25	July 27	7	26.8		48.8
		July 23	2537	100.7	July 30	July 27	7	25.5	± 0.965	50.1
		July 23	1588	108.4	July 25	July 27	7	29.9		52.1
WYE† Kent	S.H.M. Yeoman	Aug. 1	1652	90.9	July 30	Aug. 1	7	10.1	± 1.43	44.2
		Aug. 1	2116	83.5	July 30	Aug. 1	7	20.2		41.6
		July 22-3	2427	120.2	July 30	Aug. 6-7*	6	30.6		79.9
ROTHAMSTED Hertfordshire	S.H.M. Yeoman Victor	July 22-3	2796	102.6	Aug. 1	Aug. 6-7*	6	38.8	± 4.27	77.8
		July 22-3	2641	117.0	Aug. 1	Aug. 6-7*	6	37.3		84.4
PLUMPTON Sussex	S.H.M. Yeoman	Aug. 1	1682	118.5	Aug. 7	Aug. 7	7	46.3	± 2.40	66.3
		Aug. 9	2681	109.6	Aug. 9	Aug. 9	7	48.1		79.6
		July 30	1592	112.6	Aug. 6	Aug. 9	7	—†		—†
CIRENCESTER Gloucestershire	S.H.M. Yeoman	July 30	2042	101.6	Aug. 6	Aug. 9	7	—†		—†
		Aug. 8	1669	125.2	Aug. 5	Aug. 8	7	40.6		63.5
		Aug. 8	1953	110.5	Aug. 7	Aug. 8	7	39.4	± 1.81	61.7
NEWPORT Shropshire	S.H.M. Yeoman	Aug. 8	1554	135.4	July 29	July 31-	8	28.4		64.1
		July 31	2300	135.4	Aug. 1	Aug. 1	8	30.0	± 1.70	56.2
		Aug. 1	2584	124.9	Aug. 1	Aug. 1	8	35.8		65.7
WOBURN Bedfordshire	S.H.M. Yeoman Victor	Aug. 1	2439	130.8	Aug. 1	Aug. 1	8	35.8		65.7
		Aug. 1	2439	130.8	Aug. 1	Aug. 1	8	35.8		65.7
		Aug. 1	2439	130.8	Aug. 1	Aug. 1	8	35.8		65.7
SPROWSTON Norfolk	S.H.M. Yeoman	Aug. 12	1548	100.0	Aug. 8	Aug. 12*	7.2	21.9	± 1.55	30.3
		Aug. 12	1855	86.3	Aug. 9	Aug. 12*	7.2	19.2		26.1
		Aug. 6	1968	107.8	Aug. 23	Aug. 23	6	27.6		47.1
BOGHALL Edinburgh	S.H.M. Yeoman	Aug. 6	2050	95.1	Aug. 27	Aug. 27	6	31.6	± 1.18	47.1
		Aug. 6	2050	95.1	Aug. 27	Aug. 27	6	31.6		47.1
		Aug. 6	2050	95.1	Aug. 27	Aug. 27	6	31.6		47.1

* Lodging † Based on 32 three-quarter metre samples. ‡ Crop cut before samples were taken. § Squarehead's Master.

NOTES FOR THE MONTH

Cereals for Autumn Sowing

THE following note has been communicated by the National Institute of Agricultural Botany, Huntingdon Road, Cambridge:—

The importance of choosing the most suitable varieties of cereals is being more fully realized than ever by good farmers. The correct choice involves a consideration not only of the yield and quality of grain, but also of such points as length of straw and its resistance to lodging, winter hardiness, disease resistance, etc. Account must also be taken of a variety's suitability for soils of high, moderate or low fertility.

The National Institute of Agricultural Botany, as a result of its systematic trials, is able to give farmers in the Midlands, East and South of England, reliable guidance in the choice of varieties of wheat, barley and oats. It will pay them best if they make their choice of wheats from among Victor, Wilhelmina, Yeoman, Yeoman II, Little Joss, Iron III, Weibull's Standard, Rivett and Squarehead's Master or Standard Red. As regards barley, the ordinary six-row winter is most suitable where winter hardiness is demanded, though Plumage-Archer or Spratt-Archer are suitable on sheltered fields and well-drained soils. The selection of winter oats requires special care. Where winter hardiness is of first importance the Grey Winter or Black Winter varieties are likely to be the most satisfactory, but they invariably suffer through lodging if the soil fertility is above average. Bountiful stands better but is often damaged by frost. The new white oat, Resistance, bred by Dr. Hunter at the Cambridge Plant Breeding Institute, has short straw that not only resists lodging in the highest degree, but is also of good feeding quality. It is especially suitable for soils in highly fertile condition, where extreme winter hardiness is not required. It may be mentioned that the use of the term "White Winter" as a varietal name for oats should be avoided, as it is ambiguous.

Brief particulars of the purposes for which the above varieties are adapted are given in Farmers' Leaflet No. 1 issued by the National Institute of Agricultural Botany. Copies can be obtained free of charge from the Institute at Cambridge or from any County Agricultural Organizer, and inquiries about these or other varieties are always welcome.

NOTES FOR THE MONTH

Imperial Botanical Conference

THE papers read at the Imperial Botanical Conference, which was held at London on August 27-30, were of particular interest to British agriculturists as, of the three subjects dealt with, two, namely, pasture research and fruit storage, are matters concerning the entire Empire, and are not in any way strictly local in their application.

Sir Arthur Hill, in his presidential address, stressed the increasing importance of botanical research in the development of agricultural resources, and emphasized the value of pasturage investigations, citing among others "the search for species, races or varieties of pasture grasses which are highly nutritive and also resistant to dry conditions and hard grazing," a work of special value to the building up of an organized animal industry. Professor R. G. Stapledon, introducing this series of papers, dealt with the importance of "strain" in pasture plants, and described how the studies at Aberystwyth had demonstrated the wide differences that could arise, for example, from the use of varying strains of a particular clover—differences so marked in such items as feeding value, permanence and economic return, that they might have been produced by the use of desirable and undesirable species.

Mr. G. E. Blackman, of the Jealott's Hill Research Station, dealt with the nitrogenous manuring of pasture under spring conditions, and showed that growth stimulation was limited by temperature ranges; the controlling factor during midseason is water supply rather than nitrogen. Mr. Martin Jones, of the same Station, described the competition to which grassland constituents are subjected by other plants, and emphasized the importance of the correct management of grazing in this connexion.

Of the eight papers dealing with the problems of fruit storage, five were from overseas and the others were contributed by workers from the Food Investigation Board. Research on fruit storage and transport, which has grown enormously in recent years, has shown that most of the problems involve not only factors of immediate effect, such as temperature and humidity of stores, methods of packing, etc., but many others that are in operation throughout the entire life of the fruit. Among these are the effect of rootstocks, climate and soil characteristics, on the keeping quality of the produce. Dr. C. West advised caution regarding the over-rapid exploitation of gas-storage methods.

PARASITIC GASTRITIS: THE CAUSES UNDERLYING ITS DEVELOPMENT IN SHEEP

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PARASITIC gastritis is generally recognized as the most important disease of sheep throughout the world, and exercises a controlling influence over all sheep-farming practices in the British Isles. Its development in a mild form is so frequent an occurrence as to call for little or no comment by the sheep farmer, and the losses resulting from an unthrifty condition of the lambs, accompanied by occasional deaths in the less severe outbreaks, appear to be regarded rather as one of the several unfortunate circumstances incidental to sheep farming than as the result of a specific disease that calls for special preventive measures.

On account of the great prevalence of this disease the economic loss to the whole country is most difficult to estimate; some particulars obtained during the outbreak that occurred in the winter of 1933-1934 appear,^{1*} however, to be fairly reliable, and suggest that the loss is even greater than had previously been suspected. The returns showed that 43 farmers in a restricted area in the south of England lost 5,131 out of a total of 33,373 lambs, and from returns concerning the losses from poor condition it was calculated that even when allowances were made for a 5 per cent. death rate from causes other than parasitic gastritis the total loss sustained by these 43 farmers amounted to £10,341, or an average of £240 each.

Unlike the microscopic parasites that cause many of the less prevalent diseases of sheep, the worms responsible for parasitic gastritis are present wherever sheep are kept, and the possibility of their developing to disease-producing numbers is a constant menace to all who farm on good land. This circumstance necessitates the greatest care in the management of sheep, and restricts the size of the flock to numbers greatly below what the land would otherwise carry.

* For references, see page 657.

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The most important step that has yet been taken towards the satisfactory control of this disease has been the discovery of the parasitocidal effect of copper sulphate, or "bluestone," upon the "twisted wireworm." Treatment with this drug is a most effective measure where infestation with the twisted wireworm is concerned, but it is still not so widely known as it ought to be that several different species of parasitic worms are responsible for this disease; and that copper sulphate only serves for the removal of the twisted wireworm and the prevention or cure of parasitic gastritis caused by that species of worm, the several other species being untouched by the treatment. Research workers at two or three different centres have recently observed, however, that a mixture of copper sulphate and nicotine sulphate has a certain action in expelling the "minute stomach worms" known as *Trichostrongylus*, but none of the many drugs that have been tried appears to have any effect upon the several other species, some of which are a frequent cause of severe disease.

Pending such time as a cheap, safe and efficient drug treatment is found, it is, therefore, important to ensure that everything possible is done to prevent the occurrence of parasitic gastritis. In order to probe more deeply into this question of prevention, a study of the disease has been made from a new angle, and efforts have been made to discover the causes underlying the multiplication of the parasitic worms and the reasons (apart from mere presence of parasites) that lead to the development of outbreaks of the disease.

In explanation of this new line of work, a significant point, not generally recognized by farmers, should first be mentioned, namely, that the parasitic worms responsible for this disease occur wherever sheep are kept, but do not cause any apparent harm unless they are present in very large numbers. Further, they are incapable of any increase in numbers within the sheep, and every individual of the tens of thousands that may be present in a diseased sheep requires to be picked up from the pasture along with the herbage.

It is clear, therefore, that disease is not merely a matter of the infection of susceptible sheep by the parasitic worms, but that it results from the operation of all those factors that lead to the ultimate collection of sufficient worms to cause disease.

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Inquiries on the site of actual outbreaks in the field, and controlled observations in the laboratory, suggest that the margin of safety between a harmless infestation and a disease-producing infestation is a wide one. Whereas the average number of parasites in healthy lambs is only a matter of hundreds, some 15,000 or 30,000 are necessary to induce disease. Any hindrance that we can put in the way of the accumulation of excessive numbers of parasites in the stomachs of lambs will, therefore, help to keep the infestation within the limits of safety.

Since overcrowding is so obviously of importance, it might be thought that parasitic gastritis is merely the outcome of a sufficient number of sheep per acre grazing the herbage for a sufficient length of time. Field observations show, however, that this is not so, and that other factors also have a powerful influence; and there is reason to believe that slight alterations in management may make all the difference between the continuation of health, on the one hand, and a condition of unthriftiness, or even a disastrous outbreak of disease, on the other. A thorough understanding of the several less obvious factors that contribute to the increase of parasitic worms will be of great value in directing intelligent management along the most advantageous lines.

The beginning that has recently been made in this line of investigation has already produced results of practical value for the prevention of the disease, and has provided satisfactory explanations for some of the perplexing questions concerning its development.

The factors that operate for the increase of parasitic worms in sheep may conveniently be considered under three headings:—

- (1) *The Productivity of the Eggs of the Parasite* (i.e., the proportion of the parasites' eggs that reach the infective stage on the ground).
- (2) *The Transmissibility of the Infective Larvæ* (i.e., the proportion of the infective larvæ picked up by the sheep).
- (3) *The Susceptibility of the Sheep* (i.e., the proportion of infective larvæ reaching the sheep's stomach that ultimately develop to maturity).

(1) **The Productivity of the Eggs of the Parasites.**—Laboratory investigations show that certain conditions are essential for the eggs, reaching the ground with the excrement of the sheep, to give rise to larvæ, and for these immature larvæ finally to develop to the infective larvæ,

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which are capable of taking up a parasitic existence in the sheep.* Air (or, to be more correct, the oxygen of the air), moisture and a sufficiently high temperature are known to be necessary; and their influence on the development of the larvæ varies with different weather conditions and agricultural operations.

Careful inquiries into outbreaks of the disease in the field, coupled with laboratory observations, have shown something of this influence upon the propagation of infection on the ground, as follows:—

(a) *Ploughing*.—Turning in the surface of the soil with the plough appears rather to favour the survival of the parasitic worms than to bring about their destruction. Laboratory tests show that these microscopic young worms can make their way upwards through six inches of moist soil in as short a time as six days. Their longevity is found to depend very largely upon the stability of the moisture content of their surroundings, i.e., they live longest where they are maintained in a moist condition and do not become too wet or too dry. The loose soil of tilled land is therefore more favourable than is the hard surface of a permanent pasture, or the herbage on pasture land, where they would be exposed to rapid alternation of moist and dry conditions as the rain or dew alternated with dry periods.

Tilled land is, therefore, more dangerous than permanent pasture, and cultivation has an important bearing on the amount of infection remaining in the soil at the end of a long period. Observation of severe outbreaks of the disease has shown quite conclusively that disease-producing numbers of larvæ are able to remain alive in the soil for more than ten months.

The occurrence of disease in lambs that are closely folded, and not allowed to run back on to ground that has already been cleared, may often be traced to this cause, sheep having been folded only six or twelve months previously

* The life history of these parasitic worms may be outlined as follows:—

Situated in the fourth stomach of the sheep the female worms produce large numbers of eggs which reach the ground along with the dung. During suitably warm weather they hatch within 24 hours and give rise to microscopic worms that begin to feed in the dung or surrounding soil. After two or three days these immature worms, which are called "larvæ" (singular "larva"), develop a new skin and throw off the old one. They then continue to feed, and after another three or four days develop a second new skin. This time, however, the old skin is not thrown off but is retained as a loose, protecting sheath. At this stage, and not until this stage has been reached, the worms are able to take up their parasitic life in the sheep.

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on the ground where the disease develops, and having left a heavy residue of infection behind them.

(b) *Folding Sheep on Arable Land.*²—In addition to favouring the longevity of the larvæ, arable land appears to favour the propagation of infective larvæ on the ground; the trampling of wet ground by sheep results in a thorough mixing of the excrement with soil and produces a perfect medium for the development of the infective larvæ. A mixture of about equal parts of soil and excrement is often used in laboratories as being the best material on which to rear large numbers of the larvæ for experimental purposes. Excrement lying on the hard surface of a pasture is in a much less favourable position from the point of view of development of larvæ, and although laboratory tests have not been carried out, as yet, to ascertain what the actual difference in the productivity of the eggs might be under the two conditions, it is probable that hundreds develop under favourable penning conditions where only units develop on the pastures.*

(c) *Superabundance of Herbage.*—The effect of long grass is to favour the productivity of the eggs of the parasitic worms, and the ultimate development of infective larvæ by preventing the excrement of the sheep from becoming dry. Where grass is short the excrement is exposed to air currents and the heat of the sun and soon becomes dry, but in long grass the air close to the ground remains more or less saturated with water vapour and the excrement retains its moisture for a much longer period, as a result of which the propagation of infective larvæ is much more successful.†

* The power of this factor in increasing the productivity of the eggs has been observed in a certain severe outbreak where the source of infection was traced to ewes that had been folded over the infected field about four months previously. Healthy ewes pass comparatively few eggs of the parasitic worms, and the only possible explanation for the heavy infection in the lambs which were afterwards folded over the same ground appeared to be the high rate of productivity of the comparatively few eggs passed by the ewes, dependent upon exceptionally suitable conditions for larval development.

† A severe outbreak of parasitic gastritis has been observed that appeared to be attributable to the operation of this factor. It occurred among a flock of lambs grazing in a field that carried a heavy crop of clover. There was much more herbage than the lambs could possibly consume, and almost enough to cut for hay, but in spite of this plentiful supply of good food, many of the lambs died of parasitic gastritis. It seems very probable that the successful propagation of the infective larvæ as a result of the moist atmosphere which was maintained near the surface of the ground, owing to the long herbage, was a contributory cause of first importance

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(d) *Drought*.—A prolonged period of drought favours the development of the disease in two ways, and its influence over the productivity of the eggs is to bring about an accumulation of "potential infection" on the ground; or, in other words, an accumulation of material that may be a danger to the sheep at some future time.

This result of drought does not apply to every species of worm capable of causing parasitic gastritis, but as far as is known, only to the minute stomach worms called *Trichostrongylus*.^{3*} The eggs of these worms, when at the stage at which they are just ready to hatch, are exceedingly resistant to dryness and have been observed to retain their vitality under dry conditions for 15 months. As soon as they are hatched they are again dependent upon a certain amount of moisture—just as they are in the early stages of the incubation of the eggs—but when finally they reach the infective stage they are once again resistant. There are thus seen to be two susceptible stages alternating with two resistant stages on the ground.

When the excrement containing the eggs drops on to the ground during a period of drought the embryos begin to develop within the eggs. Some eggs will have hatched, and some hardly begun to develop when dryness overtakes them; both of these will be killed, but others that have had time to reach the very resistant stage just before hatching will be unaffected. Although the dryness completely arrests the development of these eggs it does not destroy them, and they are able to retain their full vitality until moist conditions recur.

In hot countries the excrement of grazing animals dries much more quickly than it does in Great Britain, and the eggs of the parasitic worms are destroyed before they reach the resistant stage. That outcome must be very rare, however, if it happens at all, in this country. Recent investigations have shown¹ that even heavy dews do not moisten the excrement sufficiently to cause the eggs to hatch, and nothing apparently occurs to move them from their resistant stage so long as the weather remains dry.

Throughout the whole of a drought period, there is thus seen to be a gradual accumulation of the living eggs of these parasites on the pastures, and when moist weather conditions return a mass production of infective larvæ takes

* Three species of *Trichostrongylus* commonly occur in sheep.

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place, and may be adequate for the development of disease in the grazing sheep.*

(2) **Transmissibility of the Larvæ.**—As every individual worm that a diseased sheep may finally harbour requires at the beginning of its parasitic life to be picked up from the pasture, it is clear that the factors governing this *transmission* of larvæ to the sheep must be of great importance in connexion with the development of the disease. One of the factors that is most powerful in its effect upon the transmissibility of the larvæ is drought.

(a) *Drought.*—Some of the peculiar migrating habits of the infective stages of the worms are well known. These minute larvæ tend to leave the excrement, when once they have reached the infective stage, and to climb on to the herbage, in the rain or dew on its surface. Although they are such small creatures they are able, under suitable conditions, to reach the tip of a 9-inch blade of grass within 12 hours. They climb most quickly in the dim light of early morning and late evening, or on dull days, but show a tendency to descend in the presence of a bright light. After two or three weeks of this ascending and descending activity, they tend to migrate from the upper parts of the grass and seek more sheltered places near the ground, and it is here that the greater part of the infection lies.⁴

During times of drought, therefore, when the pastures become very bare, the grazing sheep are in danger of picking up more infection because they are compelled to bite nearer to the ground, where more larvæ are to be found. In addition to this, however, they are compelled to graze more diligently and for a longer period each day in order to satisfy their food requirements, and so, on that account also, they collect more young worms.†

* The operation of this factor doubtless played a very important part in producing the widespread epidemic of parasitic gastritis which occurred during the winter of 1933-1934 following on the long drought that continued from the middle of the summer of 1933, through the autumn and well on into the winter. Species of *Trichostrongylus* were very largely responsible for the outbreaks that occurred at that time. It should be observed, however, that broken weather at the end of a period of drought—rain for a day or two followed by a continuation of the hot weather—destroys the accumulation of potential infection, as it causes the eggs to hatch and the larvæ to enter upon a stage in which they are susceptible to dryness.

† The outbreaks of parasitic gastritis that frequently occur during periods of drought are largely to be explained by the operation of this factor, and the early supplementing of the ration with concentrated foods is clearly indicated. Besides keeping up their powers of resistance this lessens the requirement for diligent grazing.

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(b) *Nature of the Herbage*.—Investigations now being carried out suggest that the nature of the herbage may have an important bearing on the acquisition of infection. The structure of the leaves and shoots of some plants are such that the climbing larvæ tend to be confined to the lower leaves. The blade and sheath of a shoot of grass is of such a form as to tend to divert the ascending larvæ to the underside of the lower leaves, and the central leaves of plants that produce their leaves in whorls, such as plantain or chicory, tend to be free from larvæ. Clovers, on the other hand, offer no impediment to the climbing larvæ, which readily mount up the leaf stalk and get on to the trifoliate leaf at the top.

Sheep are selective in their grazing habits and single out the choice parts of the herbage; in avoiding the relatively tough lower leaves of the grass or of plants that produce their leaves in whorls, they are thus seen to be avoiding infection, but in picking off the leafy part of the clover they are selecting the part that carries most of the young worms. The difference between the proportion of larvæ situated in these two places is found to be quite considerable, and there can be no doubt that in some instances the type of herbage may determine the presence or the absence of disease.*

(c) *Overcrowding*.—This factor also exercises its powerful influence over the development of parasitic gastritis through bringing about an increase in the transmissibility of the parasite. Supposing the number of sheep per acre to be doubled, then the chances of each larval worm being picked up are also doubled. This increase in the transmissibility of the larvæ is in addition to the increase in the number of eggs reaching the ground along with the excrement, so that the tendency for the increase of parasites in the sheep may be said to vary as the square of the concentration of sheep.

No additional comment on this factor is necessary, as its operation in the development of the disease is well known.

* This factor is probably responsible for the increased incidence of parasitic gastritis in Northumberland, following the extensive improvement of pastures by applications of basic slag. Although it is evident that the pastures are very greatly improved, the readiness with which parasitic gastritis develops renders some of them incapable of carrying even as many sheep as they were able to do when the herbage was poor, and farmers have been forced to graze a larger proportion of cattle. The greatly increased proportion of wild white clover in the pasture and the resulting increased transmissibility of the larvæ of the worms is probably responsible for this.

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(3) **Susceptibility of the Sheep.**—(a) *Age.*—The importance of this factor may often be seen where ewes and lambs are running together and an outbreak of the disease occurs. Unless the intake of infective larvæ is progressing at an extraordinary high rate the ewes are seen to acquire only a light infestation of the parasitic worms and remain healthy, although the lambs pasturing along with them carry tens of thousands of worms and are dying of parasitic gastritis.

This resistance, or “immunity,” is developed by adult sheep, partly as a result of early infection and partly as a result of their having reached a resistant age. The protection which it gives to the sheep is very effective, even against a heavy rate of infestation, but it is not an absolute safeguard, and may be forced to give way where the rate of intake of young worms is particularly high.⁵

(b) *Nutrition.*—The resistance may also be broken down where the sheep are receiving inadequate nutrition. Under experimental conditions this has been shown to have a very marked effect upon the rate at which an otherwise resistant sheep may acquire infestation, and also upon the rate of egg-production of the worms already present in the stomach. When the immunity of a sheep is broken down because of an inadequate diet, the worms that are present produce several times as many eggs as they do in resistant sheep.¹

This nutritional factor comes into prominent play in times of drought when the pastures become very bare, and burnt by the sun. What little herbage is to be grazed by the sheep at such a time is comparatively innutritious, burnt grass being poor in protein and mineral constituents, while the proportion of stem to leaf in the herbage is increased (stem has less food value than leaf), and the sheep require to graze harder and for a longer period each day in order to find sufficient nutriment for maintenance requirements.

There can be no doubt whatever that during periods of drought the sheep in many parts of this country suffer from lack of proper nutrition, crowded, as they are, on what, in normal times, is very good pasture. As a result, the powers of resistance of the adult sheep become depressed, and young worms that are picked up along with the herbage are able to establish themselves in the sheep.

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Summary and Conclusion.—The factors governing the increase of parasitic worms to disease-producing number fall into three categories:—

- (1) *The Productivity of the Eggs of the Parasite* (i.e., the proportion of the parasites' eggs that reach the infective stage on the ground).
- (2) *The Transmissibility of the Infective Larvæ* (i.e., the proportion of the infective larvæ picked up by the sheep).
- (3) *The Susceptibility of the Sheep* (i.e., the proportion of infective larvæ reaching the sheep's stomach that ultimately develop to maturity).

The operation of the factors is found to be influenced by weather conditions and agricultural practice, as follows:—

The productivity of the eggs is increased by ploughing and cultivation, by folding, superabundance of herbage and (of some species of the parasitic worms known as *Trichostrongylus*) by prolonged drought followed by a wet period; the transmissibility of the larvæ is increased by drought or shortage of herbage from some other reason, by a large proportion of clover in the pasture, or by a high concentration of sheep (overcrowding); and the susceptibility of the sheep is increased by malnutrition, as a result of drought, or from some other cause, and depends upon their immaturity, adult sheep being much the more resistant.

This investigation provides a satisfactory answer to several perplexing questions: the reasons for the widespread epidemic of the winter of 1933-1934; the reason for two kinds of outbreak that appear in sheep folded on arable lands ("auto infestation," where they are allowed to run over land that they have already cleared, and "residual infestation," where the larvæ have remained in the soil from a previous folding of sheep); and the reason for the very acute nature of some of the outbreaks that occur on arable land. An indication is also given of the dangers of certain kinds of herbage and conditions of pastures. It is clear that there are other factors of which, as yet, we know nothing. Evidence of this is to be seen where one farmer keeps a high concentration of sheep to the acre without any apparent harm, while another farmer, with only half as many sheep to the acre, is continually in danger of an outbreak of parasitic gastritis. A continuation of this line of work may give some indication of what these factors are.

The control of this disease is still an urgent matter for scientific investigation, and is not likely to be satisfactorily achieved until some safe, cheap, effective and easily

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administered curative treatment is found. As has been explained, however, it may be avoided by preventing the worms from becoming too numerous, and our knowledge of the factors which govern their increase should be used to full advantage.

REFERENCES.

- ¹ Taylor, E. L. 1934: The Epidemiology of Winter Outbreaks of Parasitic Gastritis in Sheep, with special Reference to Outbreaks which occurred during the Winter of 1933-1934. *Jour. Comp. Path. & Therap.*, Vol. 47, pp. 235-254.
- ² Taylor, E. L. 1934: The Epidemiology of Parasitic Gastritis in Sheep. Observations on the relative Importance of the various Factors concerned in the Development of the Disease. *Jour. Agric. Sci.*, Vol. 24, pp. 192-208.
- ³ Monnig, H. O. 1930: Studies on the Bionomics of the free-living Stages of *Trichostrongylus* spp. and other parasitic Nematodes. 16th Rep. Direct. Veterinary Services and Anim. Indust., Union of S. Africa, pp. 175-198.
- ⁴ Veglia, F. 1915: The Anatomy and Life History of the *Hæmonchus contortus*. 3rd and 4th Repts. Direct. Veterinary Services and Anim. Indust., Union of S. Africa, pp. 347-500.
- ⁵ Taylor, E. L. 1934: Field Experiments on the Immunity of Lambs to Parasitic Gastritis caused by a mixed Infection of Trichostrongylid Nematodes. *Jour. Helminthol.*, Vol. 12, pp. 143-164.

ROPY MILK*

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OF the abnormal changes which sometimes take place in milk, one of the most common and persistent is that which gives rise to what is called "ropy" or "slimy" milk. Such milk, when poured from a jug, has a rope-like form. A spoon or wire dipped into the milk and then taken out draws after it thread-like strands sometimes more than a yard in length. Such an abnormal appearance naturally alarms the consumer, while the persistence of the trouble frequently causes great loss to the producer or retail seller.

Bacterial Ropiness.—The ropiness which appears in the mixed milk of a herd several hours after milking, and which increases on allowing the milk to stand, is due to the growth of bacteria, which, as a general rule, gain access to the milk after it has left the udder of the cow, though in a few instances they may exist in the udder before milking. This kind of ropy milk, though abnormal and prejudicial from the seller's point of view, is quite wholesome and does not endanger public health.

"Garget" Milk.—Ropiness, however, is sometimes observed in milk from individual cows, notably in cases of inflammation of the udder. In such instances, the cause may be either bacterial or non-bacterial. If the ropiness does not increase when the milk is kept and cannot be propagated by transference into another sample of fresh milk, it is probably due to the presence of fibrin and white corpuscles from the blood, which form masses of slimy material in the milk. Such milk ("garget" milk) may not cause other milk to become ropy, but organisms are present in the milk which may lead to infection being spread from one cow to another, by the hands of the milker. For this reason, prompt attention should be given to all cows suffering from this disease, and all sources of infection avoided. Milk of this nature should not be used for food, and may be described as "stringy" milk to distinguish it from ropiness of bacterial origin.

Physical Ropiness.—Ropiness which is only apparent when the milk is passing over the cooler is known as

* Revision of the Ministry's Leaflet No. 266.

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“ physical ropiness,” and is due to films of proteins on the surface of the milk. This ropiness, however, is temporary and has no economic significance.

In this article the description “ ropy milk ” is confined to the first type of milk referred to; “ garget ” or “ stringy ” milk is not dealt with here.

Organisms producing Ropiness in Milk.—Ropiness may be produced by (1) micrococci; (2) Gram negative bacteria, including *B. lactis viscosus* and *Pseudomonas*; (3) *B. aerogenes* and other coliform organisms; (4) *S. lactis* and other lactic acid streptococci; (5) aerobic sporeformers; (6) diphtheroids (*Corynebacteria*); and (7) *Lactobacilli*.

The ability to produce ropiness, however, is only a temporary character of most of these bacteria. The most important of the types mentioned are the micrococci and the Gram negative bacteria (the so-called *Bacillus lactis viscosus* and *B. aerogenes*). These are commonly found in water.

Sources of Infection.—The bacteria causing ropiness gain access to the milk after it leaves the udder. Unless properly sterilized, everything which comes in contact with the milk will increase the number of micro-organisms in the milk. It has been found that common sources of infection of “ ropy milk ” organisms are:—

- (1) Dirt from the cow or the worker.
- (2) Contamination from milk utensils, cloths, strainers, coolers, churns, or any other material with which the milk comes in contact.
- (3) Contaminated drinking water or marshy land which may infect the udders or flanks of the cows.
- (4) The water used for washing up the utensils, etc. Such water may also infect milk passing over a leaky cooler.
- (5) Straw, mouldy hay, bedding, manure, etc., which may show the presence of organisms producing ropiness in milk.
- (6) Dust-laden air.
- (7) Certain plants, e.g., butterwort.
- (8) Feeding stuffs.

Of these, infected water, in which churns are placed to cool or utensils washed, is the most important. Feeding stuffs, bedding and inefficiently sterilized utensils are the next most common sources of infection.

Tests to be used in cases of Ropiness in Milk.—On the appearance of ropiness, it should first be ascertained whether the outbreak is due to bacteria by adding a few drops of the affected milk to some new milk in a clean glass. This glass should then be placed in a warm room and kept loosely covered to prevent dust from getting into it. The

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time taken for ropiness to appear should be noted, and is of the greatest importance from a practical point of view, since it can be assumed that ropiness which does not appear until after three days would not affect the sale of the milk. Since contamination of milk utensils, etc., is a very common source of infection, immediate steps should be taken to investigate this possible source of error by washing and drying the udder and teats of a cow, then milking the cow, and allowing the milk to pass through all the usual stages on the farm. Samples from the milk should be taken at each stage, e.g., from each teat, from the milking pail, the cooler, the churn or other receptacle in which it may be placed, and put into clean glasses and the development of ropiness (if any) observed. In this way, infection from the cow or from the utensils may be discovered. Contamination of the cow's udder or flanks may be due to standing in marshy land or in a contaminated water supply. Such sources of infection may be investigated by putting the milk from unwashed cows into clean glass vessels and keeping the sample. The incidence of ropiness in it may then be studied. The possibility of infection by water used for washing the churns, etc., may be tested by adding some of the suspected water to a glass of fresh clean milk. Contamination by air may be discovered by leaving a glass of clean milk exposed in the dairy and in the cow-shed. The possibility of infection from plants may be tested by inspection of the pasture.

The results of these experiments will probably indicate the source of the trouble, and the measures described below for dealing with the discovered source of infection should be carried out. On an outbreak of ropiness, however, it would be as well to adopt the whole of the following precautions.

Preventive Remedial Measures.—All too frequently when an outbreak of ropiness occurs, the whole of the utensils, dairy, etc., becomes infected with the bacteria causing the fault. Thus, even if the main source of infection be discovered by the tests indicated above, its removal will not necessarily result in the disappearance of the trouble unless the measures described below are followed:—

(1) Dirt from a cow or worker may be avoided by attention to the cleanliness of the cow, of the worker and of his clothes.

(2) Contamination by milk utensils, cloths, churns, etc. *All these must be thoroughly washed, then completely immersed in actively boiling water for a period of not less than ten minutes, or sterilized*

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by steam. Scalding does not ensure the production of the state of cleanliness which is necessary. After the utensils, etc., have been boiled or steamed they *must not be rinsed with water before use*, but must be kept in a clean place and protected from dust. This may be accomplished by turning the milk pails upside down and covering the utensils, etc., with a cloth which has been washed and either boiled or steamed. *Wooden vessels should not be used for milk as they may persistently retain ropy organisms.* It is not advisable to use wooden troughs even for washing milk vessels.

(3) Contaminated water supply or marshy land which may act by infecting the surface of the cow's udder or flanks. The cows must not be allowed to stand in the contaminated supply or to wander on to marshy land in which they may infect their udders. In some cases it has been found necessary to fence off such land.

(4) Contaminated water supply which may be used for washing utensils. If this is found to be the source of infection, consideration must be given to the possibility of procuring a cleaner supply of water, a task which may not be easy of accomplishment. Very considerable protection against the danger of this evil may be attained by efficient washing and sterilization of all utensils as described under (2). The possibility of a leaky cooler must not be forgotten.

(5) Straw, mouldy hay, etc., may show the presence of the organisms which produce ropiness in milk. The custom of wiping the udder of the cow with a wisp of straw before milking is a bad one. After washing their hands for milking, workers should not handle straw or fodder, nor should any such material be brought into the cow byre just before or during milking. The milking stool must be scrupulously clean or it may infect the hands of the milker.

(6) Infection by air. Air infection may occur either in the cowshed or in the dairy, especially in hot, dry weather. It is best avoided by keeping these free from dust. The rooms where the milk is kept should be well cleaned. Wooden, cement or stone floors, walls or racks, etc., may first be washed down and then either disinfected by a solution of bleaching powder or, where possible, limewashed.

(7) Certain plants, e.g., butterwort, may be a source of infection. An investigation of the pasture land will demonstrate the presence or otherwise of plants which may be a source of infection. If there be any reason to suspect their presence, then the cows must be removed to another pasture.

(8) If feeding stuffs have been shown to be a source of infection, these should not be introduced into the byre until after milking.

Conditions controlling Ropiness.—In all infections, such as ropiness, two factors are necessary: (1) a continuous and heavy seeding of the milk with the causative organism, (2) conditions in the milk suitable for the growth of the bacteria and production of the slimy substances actually responsible for ropiness.

General Observations.—The common ropy milk organisms grow best in the presence of oxygen. It is found sometimes, that ropiness is confined to the top layer, but usually the entire bulk is affected. Low temperatures favour the development of ropiness, since not only do the bacteria concerned grow best at rather low temperatures (their optimum is 20°-25° C. as against 37°-42° for *B. coli*), but

ROPY MILK

low temperatures favour the production of the slimy substances by the bacteria.

Effect of Pasteurization. —Efficient pasteurization (145° F. for 30 minutes) will, in all but exceptional cases, kill ropy milk organisms. *B. lactis viscosus* is readily destroyed, but *B. aerogenes* may withstand 63° C. (145° F.) for 20 minutes, especially if mature cells (as opposed to young growing cells) are present. For this reason, holding at 15° C. (60° F.) for 45 minutes before pasteurization has been recommended. This treatment allows the bacteria to grow, with the result that the ensuing population of young cells is more readily destroyed by heat treatment. It is essential, of course, to avoid post-pasteurization contamination.

The Mechanism of Slime Formation. —Ropiness is caused by the formation of gums and mucins. The former are more common and are derived from lactose, which is fermented by *B. aerogenes* and other coliform bacteria, *S. lactis* and similar streptococci, and the lactobacilli. Mucins are combinations of proteins with a carbohydrate radical, and may be produced by the peptonising bacteria (the micrococci, *B. lactis viscosus* and other Gram negative bacteria, aerobic spore-formers and diphtheroids). Sliminess, or ropiness, is intimately related to capsule formation. Thus, the "ropes" consist of long chains of bacteria held together by their capsules. In some cases the capsulation is a temporary accompaniment of cell proliferation, and the gummy substance is then dissolved in the milk. Such ropiness is destroyed by thorough agitation.

It has recently been noted that a bacteriophage found on vegetables readily induces strains of *B. aerogenes* to form slime. This may be an important factor in the prevalence of ropy types in feeding stuffs and on plants such as butterwort.

Further information may be obtained in Rogers, *Fundamentals of Dairy Science*, 1935 Ed., pp. 357-360; this JOURNAL, 18, pp. 991-1004. *Bulletin 631*, N.Y. State Agric. Ex. Sta., Geneva, N.Y., and Hammer, *Dairy Bacteriology*, 1928 Ed., pp. 42-51.

Samples of ropy milk may be sent to the Provincial Dairy Bacteriologist, or to the National Institute for Research in Dairying, for identification of the causative organism, and advice as to the eradication of the trouble.

THE USE OF A WETTER IN WEED SPRAYING

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SULPHATE of ammonia, in crystal form or in solution, has proved to be highly efficient in destroying some of the worst weeds of lawns and playing fields. In two unusual and difficult cases, described below, however, it became evident that only a small proportion of the material applied actually remained on the leaves of the weeds. This fact, particularly apparent when weeds are sprayed in the seedling stage, led to the use of a "spreader" or "wetter," which resulted in a very great increase in efficiency.

(1) An Association Football pitch, on heavy clay soil, had, by excessive use in late winter, become badly worn by the end of March, 1934. As a step towards renovation it was top dressed with finely-sieved soil. By error, contrary to established practice, no germination tests for weed seeds were made on the soil before it was used. The summer of 1934 was excessively dry, and the grass failed to fill up by growing into the bare patches. A certain number of seedlings of *Polygonum aviculare* (Knot-weed, Knot-grass, Wire-weed or Pig-weed) appeared, and by midsummer had become well-grown plants and were particularly noticeable in the patches devoid of grass. The seriousness of this lay in the fact that the mower failed to cut the procumbent stems of the weed, which *more suo* seeded profusely (the field was mown over regularly, as part of it was used for tennis). As many as possible of the plants were removed by hand—an expensive process—but great quantities of seed nevertheless fell to the ground.

The season began with many patches on the pitch—places that *P. aviculare* had occupied all the summer and, dying, left bare. At the end of the football season in 1935 the pitch was again very cut up, and by mid-April last every bare patch teemed with seedlings of *P. aviculare*. Trials were made with solid sulphate of ammonia broadcast and with solutions, but only a small proportion of seedlings was killed. Several turves were therefore boxed and grown on

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in a greenhouse for trials with various sprays. These preliminary trials showed clearly the part played by the waxy coating of the cotyledons and seedling leaves in preventing the adhesion of the spray solution. Soft soap, as a wetter, was therefore included with sulphate of ammonia in a water solution. It proved, in contrast to the ineffective water solution of sulphate of ammonia alone, to be completely effective.

Treatment was at once applied to the field and, after preliminary trials, the following quantities were used:—

1 lb. Ammonium sulphate
 $\frac{1}{2}$ lb. Soft soap
1 gal. Water

to 16 sq. yd. This was applied with a hand fruit-sprayer (bucket and pipe type) and destroyed most of the weed seedlings. The method was slow, however, and it was essential to kill all the weeds before they passed far beyond the seedling stage. Application by watering-can, using 2 gal. of solution per 16 sq. yd., was therefore tried. This killed almost all of the seedlings and was much simpler and easier. Some seedlings growing in the grass at points where it was thick were damaged but not killed. These were dealt with by mowing very closely and repeating the application. The grass was, of course, "scorched" by the treatment, but suffered no real harm, and, despite the dryness of the 1935 summer, quickly recovered. By the end of August only a few plants of *P. aviculare* were to be found. It is difficult to think of any other means by which what seemed a very serious menace, could have been met. This weed, occupying large patches in summer and leaving them bare in winter, is extremely damaging to a football field.

(2) The second employment of the method was on a lawn on very light, poor, gravelly soil. During early summer in 1933, a few plants of *Trifolium striatum* appeared. Their procumbent stems were missed by the mower and they therefore shed seed in plenty. As a result there was in the summer of 1934 a much increased population, and this was followed by an extremely dense one in 1935. *T. striatum* thrives in drought and, forming large flat plants, completely destroys the grass over which it spreads. By mid-August, 1935, the lawn was brown and to any but the eye of faith and experience, dead. It made a rapid but patchy recovery with the rains of late August

USE OF A WETTER IN WEED SPRAYING

and early September. By mid-September every bare patch had become vividly green with the seedlings of *T. striatum*. These were so abundant as to resemble sowings of mustard and cress.

On September 14, replicated plots, each of 16 square yards, were laid out at the worse-affected end of the lawn, and the following treatments were allotted to them at random, application being by watering-can:—

- (a) 2 lb. Sulphate of ammonia
1 lb. Soft soap
2 gal. Water
- (b) 2 lb. Sulphate of ammonia
2 gal. Water
- (c) 1 lb. Soft soap
2 gal. Water
- (d) Control—no treatment

Heavy rain fell about twenty-four hours after the application. The results were so emphatic as to make it unnecessary to count the proportions of dead and surviving seedlings. Treatment (c) left small yellow patches on some of the leaves but killed no plants; (b) damaged many plants but killed only a small proportion; treatment (a) killed virtually all the seedlings in the patches devoid of grass and a high proportion of those growing among the grass stems. The grass soon recovered from its temporary scorching.

It is, of course, certain that in neither case is the trouble finally disposed of, for fresh germinations will no doubt continue for two or three years more; but the efficacy of employing a wetter is unquestionable as far as the seedling stage of these two weeds is concerned.

Improvements in technique could no doubt be made. A fine precipitate is formed on addition of concentrated soap solution to concentrated ammonium sulphate solution, for the purpose of forming a stock concentrated spray, no doubt by the "salting-out" of soap. On placing the stock aside, this precipitate tended to coagulate to a soap gel difficult to redissolve on dilution of the spray, and free ammonia was also evolved. It was therefore found expedient to make up concentrated solutions of soap and ammonium sulphate separately, and to mix these in the desired proportions with the requisite quantity of water just before spraying (the fine precipitate so obtained does not interfere with spraying in the least). The preparation of the soap solution is the slowest and most tedious part of the process at present, water at about 80°C. being necessary to

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dissolve the soap. It is clear that further trials should be made, to cover a range of concentrations of soap and of ammonium sulphate, of other wetters, and for various weeds in both the seedling and later stages.

Wetters have not previously been used with weed killers for lawns,* and it is possible that their employment might add to the efficiency of other weed killers used on lawns, besides ammonium sulphate. It is also possible that single substances, such as ammonium caseinate, or an ammonium soap, might be found to embody both the toxic and wetting powers of the mixture used successfully here, without suffering from the defect of incompatibility of toxic principle and wetter. It is not possible to find time to pursue the investigations here described, which are recorded in the hope that others, in whose field of interest they lie, may be led to follow what appears to be an effective development in weed destruction by spraying.

* Cf. R. M. Woodman and W. A. Jones, *Chem. News*, 1932, **144**, 21, for their employment with weed killers on fallows.

A STUDY OF TOMATO PRICES

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THE careful recording of prices over a period of years always forms an interesting study. The prices at present under review are the weekly figures obtained and recorded by an English tomato grower from 1908 to 1934. They reveal, not only the fluctuating fortunes of the grower, but the effects of changing conditions on the market and the adaptation of production by the grower to meet each new condition.

1. General Trend of Prices.—An examination of the figures during the period mentioned will show the general trend of prices during the 27 years. To indicate the variations in seasonal prices, the average price obtained during the third week in July is taken to represent a fairly true measure of tomato prices in any given year. The prices during this week are represented in Diagram I. It will be noticed that between 1908 and 1916 the hatched columns are nearly of equal length as prices were on the whole stable at a level of 3s. 6d. to 4s. 6d. per doz. lb. Between 1917 and 1920 abnormally high prices, rising to over 11s. in 1919, were obtained. Since 1921 prices have been much more irregular than in pre-war years, but there has been a general trend towards lower prices until, in 1933 and 1934, prices have practically reached the pre-war level, being between 4s. and 5s. per doz. lb.

2. Seasonal Variation in Prices.—Between 1908 and 1914, as shown by the graph in Diagram II, there was no great fluctuation in prices during the season; in 1913, for instance, average weekly prices were between 3s. and 6s. 2d. and the graph is fairly straight. 1916 to 1920 was a period of irrational prices and great variation which defy analysis, and, although prices now follow a more regular trend, there is a considerably greater irregularity than obtained before the War. The most marked feature of the seasonal variation is the relatively higher prices obtained at the beginning of the picking season, followed

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by a sharp fall at the beginning of June (see graph). During the period 1922 to 1934, after the first sharp decline, prices usually fall steadily, but to a lesser degree, until the end of July. A higher price is usually secured in the first or second week of August, and this can be attributed to increased demand for tomatoes during the holiday period. From 1922 to 1927, prices remained at a fairly stable level during August and September, but, in 1928 and 1929, depressed prices prevailed from mid-August and during September. In 1933 and 1934, a sharp fall in prices occurred in the third week of August, and the price level remained at the depressed low level until the third or fourth week in September.

A rise in prices between the first and third weeks in October is the general rule, but, whereas in pre-War years this rise was maintained until the end of the season, which was then December, a falling off has been experienced since 1926 during November, and this has led to the earlier grubbing of the plants.

Although the prices that form the basis of this study are recorded by a single grower, they do not constitute in any way a "special case," and from the fluctuations of these prices and the adjustments of the cropping period made by the grower, conclusions may justifiably be drawn as to the fortunes of the tomato-growing industry as a whole in this country.

3. Modifications of the Cropping Season.—The grower's reaction to the variation in prices through the season is to adjust his output so as to have the maximum possible quantity of tomatoes for sale when the highest prices are obtainable. Such adjustments are most noticeable at the beginning and end of the season, for it is then that the art of the grower can most skilfully be brought into play—during August and September bountiful cropping is a feature of the tomato plant's normal activity.

(a) *Early Tomatoes.*—The production of early tomatoes is very largely a development that is of fairly recent origin. Before 1910 the first crop was not ready to pick until the second or third week in June, but after 1910 earlier and earlier crops were gradually produced. From 1911 to 1913 picking began in the first week of June, then, until 1919 in the fourth week of May, and subsequently in the third, second and even first week of May. Since 1929 the beginning of the season has become apparently stabilized at the second week of May.

The reason for the early production of tomatoes can be readily found in the high prices obtained for the crops at the beginning of

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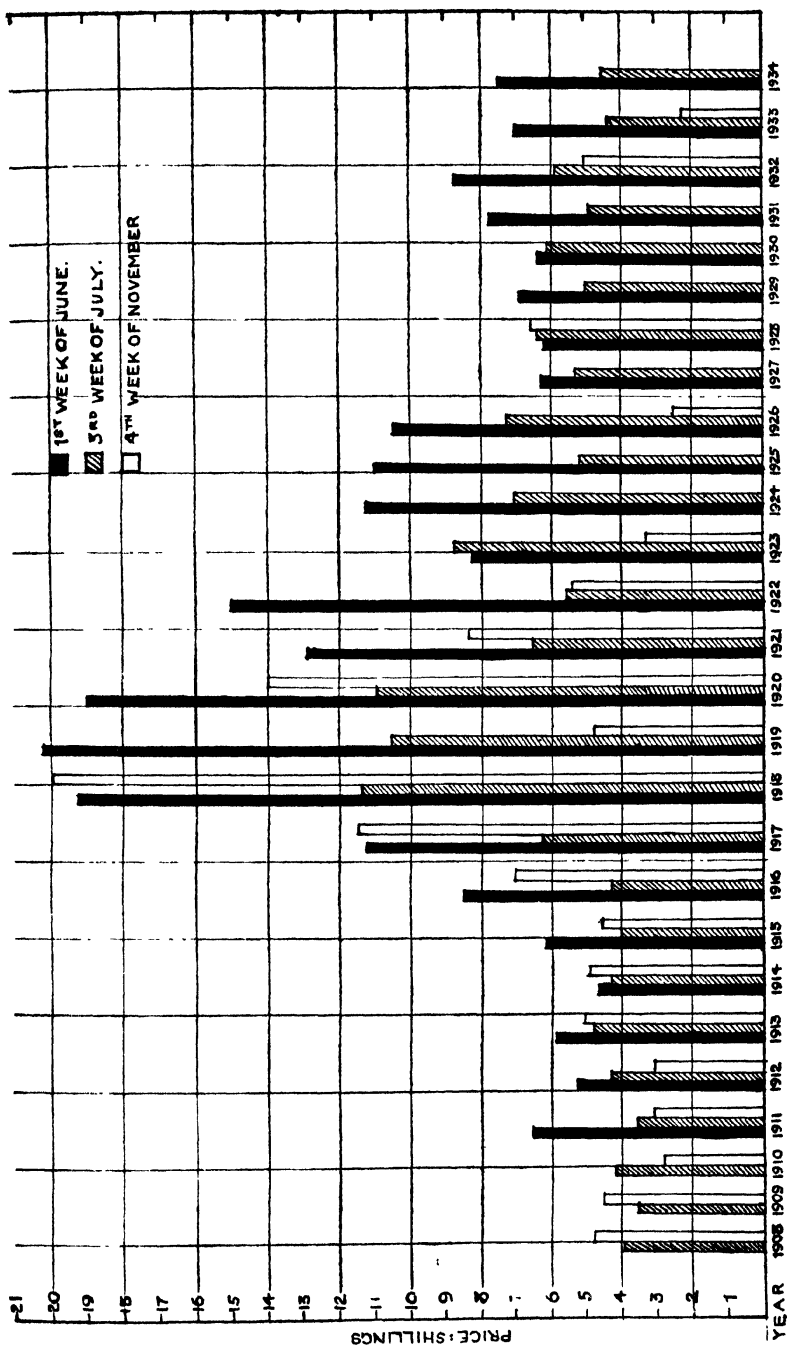


DIAGRAM No. I.—Tomatoes: Average Gross Prices in Certain Weeks.

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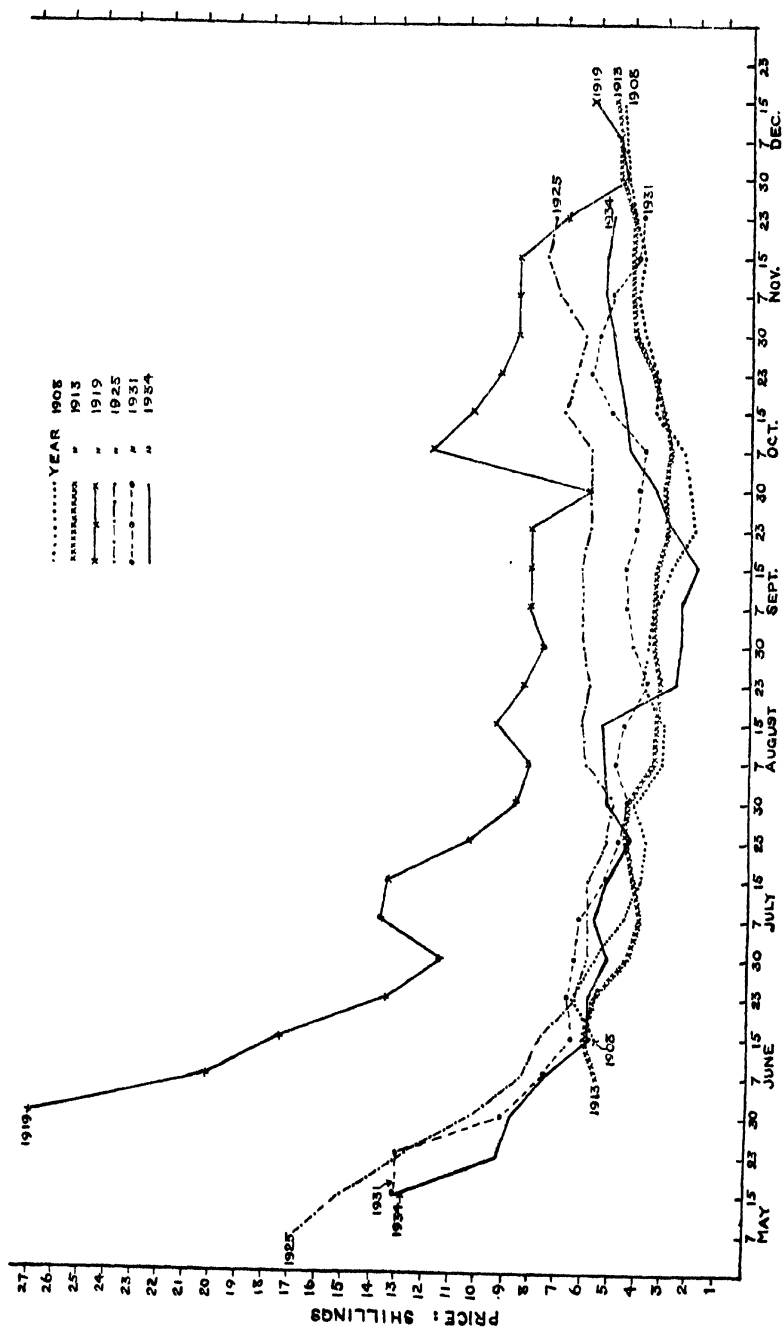


DIAGRAM NO. II.—Tomatoes: Annual Variation in Average Gross Weekly Prices.

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the season. The development of tomato growing in cold houses in Holland, with the resultant increasing imports into the United Kingdom, had the effect of depressing prices during August, so that growers sought to recoup themselves by producing earlier crops.

The appreciation by the public of well-flavoured English hot-house tomatoes has probably been the reason for the maintenance of the price of tomatoes in May at a sufficiently high level to repay the grower for the heavy extra expenditure necessary for fuel. Great endeavours are, however, being made in the Canary Islands to produce tomatoes of the type desired by English consumers, and to pack them in the most attractive way. It is, therefore, possibly doubtful whether, in the absence of any protective tariff duty during May, the advantages of early production will be maintained.

(b) *Late Tomatoes*.—In contrast with the expansion of the picking season in the early months of the year curtailment has taken place towards the end. Until 1919 the plants were kept in the houses, and picking was usually continued until the third week in December, and sometimes even later, the steady increase of prices from October onwards forming the necessary stimulus. Before the War, imports of tomatoes, although by no means non-existent, did not compete seriously with home-grown tomatoes at this period of the year, owing to their inferior quality. From 1921 onwards, imports from the Canary Islands have steadily increased, and at the same time have so improved in quality and presentation that they compete more and more with the English product. Varieties have been chosen that appeal to the English taste; packing that was formerly in peat has now been replaced by an excellent pack, in non-returnable boxes, each tomato being wrapped separately in tissue paper. Consequently, a fall in prices now occurs at the beginning of November or even earlier, and prices, instead of being considerably higher than those of the mid-season crop (third week in July) as they were in the pre-War period, are now less, so that growers pull out their plants about the end of November. Growers have adjusted their business to the new conditions by finishing with their plants relatively early and clearing their houses quickly, generally in order to grow another crop such as chrysanthemums or winter lettuce. It has been estimated that, between 1925 and 1931 alone the production of chrysanthemums has been more than doubled.

4. Effects of Imports and Tariffs on the Prices of English Tomatoes.—Tomatoes are imported from a number of countries, the most important being Holland, the Channel Islands and the Canary Islands. Imports have also been made from France, Italy, Spain and Portugal, where tomatoes are grown primarily for home consumption, so that the quality, shape and appearance did not appeal to the English buyer. In Holland, the Canary Islands and the Channel Islands, however, tomatoes are grown especially for export, and much care is taken to produce the article required by the English consumer. Tomatoes from these countries have, therefore, gradually come to form the whole of the imports: in 1908 tomatoes from France, Spain and other foreign countries (excluding the Netherlands and Canary Islands) formed 29 per cent. of the total imports; in 1926 tomatoes from France, Italy, Spain and other

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IMPORTS (IN CWT.) OF TOMATOES INTO THE UNITED KINGDOM FROM THE COUNTRIES NAMED FROM 1908 TO 1934.

Year	Netherlands	Spain	Canary Islands	France	Italy	Other Foreign Countries	Channel Islands	Other British Countries	Total
1908	6,494	182,185	577,198	120,895	755	22,322	250,278	136	1,160,283
1909	9,624	200,211	542,045	93,816	2,422	24,812	288,378	—	1,161,308
1910	23,447	184,081	691,819	80,430	944	29,509	240,935	68	1,251,233
1911	57,377	173,254	664,310	70,848	5,456	27,942	363,155	22	1,362,364
1912	96,030	149,534	752,612	66,903	2,551	27,881	329,237	2	1,424,750
1913	132,741	184,273	765,833	65,720	1,418	24,275	408,726	—	1,582,986
1914	135,237	143,088	700,611	24,806	331	18,967	553,577	—	1,576,617
1915	87,546	128,869	731,839	10,357	783	19,564	415,923	16	1,394,897
1916	27,078	252,026	801,483	24,965	526	28,604	514,550	—	1,649,232
1917	21,221	—	72,263	12,456	—	—	413,161	—	519,101
1918	37,080	—	—	10,185	971	196	467,980	—	516,412
1919	182,056	11,613	484,807	23,053	580	14,376	589,434	449	1,306,368
1920	277,579	148,836	587,164	41,778	5,594	14,945	540,730	85	1,616,711
1921	362,279	122,861	919,914	62,945	1,649	13,533	796,138	1,533	2,280,852
1922	416,026	140,604	1,212,208	41,813	2,948	7,489	498,709	1	2,319,798
1923	351,632	155,745	1,132,760	36,734	1,633	4,084	526,621	78	2,209,287
1924	381,547	169,928	1,217,978	53,363	10,404	14,657	589,842	215	2,437,934
1925	445,149	190,377	1,113,780	46,445	15,173	11,623	650,362	5,369	2,478,278
1926	431,562	145,783	897,123	59,274	25,505	10,099	731,049	1,589	2,301,984
1927	444,072	154,801	994,863	53,867	16,477	10,584	652,289	5,093	2,332,046
1928	491,854	149,345	1,198,981	77,179	6,865	10,580	869,575	491	2,804,870
1929	610,545	114,039	1,218,040	38,753	16,681	12,674	740,505	216	2,751,473
1930	665,071	88,508	1,393,997	26,982	5,019	7,857	863,161	1,506	3,052,101
1931	730,533	92,190	1,295,266	20,463	(a)	29,387	768,383	214	2,936,436
1932	467,201	10,604	1,116,237	406	(a)	8,570	828,671	426	2,432,115
1933	249,152	1,127	1,467,099	(a)	(a)	3,476	1,183,069	1,676	2,904,599
1934	229,335	52	1,430,795	(a)	(a)	808	1,114,599	112	2,775,661

(a) Quantities, not shown separately in Trade Returns, may be included under "Other Foreign Countries."

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MONTHLY IMPORTS OF TOMATOES INTO THE UNITED KINGDOM IN CERTAIN YEARS

	Total		Netherlands	Spain and Canary Islands	Channel Islands	Other Countries	Total
	<i>cut.</i>		<i>cut.</i>	<i>cut.</i>	<i>cut.</i>	<i>cut.</i>	<i>cut.</i>
1901	January 73,400 February 69,350 March 86,928 April 74,917 May 88,901 June 127,793 July 171,978 August 124,757 September 119,224 October 75,722 November 74,292 December 73,012	1901	— — — — — — — — — — — — —	— — — — — — — — — — — — —	— — — — — — — — — — — — —	— — — — — — — — — — — — —	138,206 118,664 124,925 142,384 226,193 269,570 331,288 301,527 359,167 212,338 153,669 105,917
1911	January 77,065 February 106,701 March 87,363 April 119,854 May 160,878 June 196,569 July 165,702 August 165,630 September 186,704 October 148,619 November 100,674 December 67,229	1911	— 27 55 8 10,700 80,194 169,429 242,449 158,816 52,994 8,756 4,269	123,678 136,426 134,759 220,245 242,727 118,946 39,301 1,537 1,842 38,878 171,451 155,543	12 — 2 1,526 47,401 151,744 131,806 88,131 153,189 170,369 23,137 1,038	108 118 338 6,135 69 3,723 12,764 11,757 10,367 2,179 1,716 908	123,798 136,571 135,154 233,914 300,897 354,607 353,300 343,874 323,414 264,420 205,060 161,757
1911	January 237 February 9,847 March 17,408 April 28,772 May 105,218 June 162,550 July 143,801 August 192,378 September 253,198 October 178,473 November 114,969 December 99,487	1911	— — — 129 12,525 24,893 40,977 115,152 12,991 18,526 5,133 167	135,431 127,855 185,002 246,979 317,176 35,975 171 — — 23,762 169,573 184,273	12 — 31 5,136 91,103 180,327 184,533 186,139 280,145 — 12,469 336	67 80 76 138 53 114 53 210 25 20 214 15	135,510 127,937 185,109 252,382 420,857 250,309 224,834 301,501 302,161 184,963 197,389 184,791

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foreign countries formed 10 per cent. and in 1934 only 0.4 per cent. of the total imports.

UNITED KINGDOM IMPORTS.

*Imports of Tomatoes into the United Kingdom. Season
November 1, 1933, to October 31, 1934.*

(Extracted from Monthly Trade and Navigation Accounts.)

Month	Channel Islands	Other British Countries	Netherlands	Spain	Canary Islands	Other Foreign Countries	Total
<i>1933</i>	<i>cwt.</i>	<i>cwt.</i>	<i>cwt.</i>	<i>cwt.</i>	<i>cwt.</i>	<i>cwt.</i>	<i>cwt.</i>
November	7,494	--	4,940	1,120	218,707	2	232,263
December	205	--	253	633	135,066	452	136,609
<i>1934</i>							
January	12	11	--	90	135,341	56	135,510
February	2	35	--	--	127,855	45	127,937
March	31	28	-	--	185,002	48	185,109
April	5,136	18	129	--	246,979	120	252,382
May	91,103	12	12,525	-	317,176	41	420,857
June	189,327	7	24,893	--	35,975	107	250,309
July	184,533	--	40,077	--	171	53	224,834
August	186,139	1	115,152	--	--	209	301,501
September	289,145	--	12,991	--	--	25	302,161
October	152,655	--	18,526	--	23,762	20	194,963
TOTAL	1,105,782	112	229,486	1,843	1,426,034	1,178	2,764,435

(a) *Imports from Holland.*—In 1908 imports from the Netherlands were negligible; by 1931 they had risen to the huge total of nearly three-quarters of a million cwt. Dutch tomatoes were first grown in temporary structures erected annually and unheated, and the bulk of the crop was not ready to pick until August and September. By 1931, however, permanent heated tomato houses were in use, and considerable quantities of tomatoes were exported in July, and some in May and June. The consequent effect of the presence of tomatoes imported from the Netherlands was, therefore, a general lowering of prices during the period of greatest demand.

In 1932 tariff duties were first imposed, and these had the effect of greatly curtailing the imports of tomatoes from the Netherlands, and by 1933 and 1934 these were less than one-third of the quantity imported in 1931. In consequence, the prices of English tomatoes reached a higher level until mid-August, when another factor—imports from Jersey—came into play. Another point of interest is that, as the tariff came into force on June 1, imports from the Netherlands during May were increased by 2,000 cwt.

(b) *Imports from the Channel Islands.*—A sudden drop in prices in mid-August occurred first in 1932, when prices fell from 5s. 5d. to 3s. 7d., again in 1933 when the fall was from 4s. to 2s. 5½d., and in 1934 when prices fell from 5s. 6d. to 2s. 9d. and did not rise again to over 3s. until the last week in September.

This break in prices was due to greatly increased imports of tomatoes from Jersey, these rising from 340,000 cwt. in 1931 to 378,000 cwt. in 1932 and 669,000 cwt. in 1933. The stimulation of the Jersey production was a direct result of the tariff duties. These duties,

A STUDY OF TOMATO PRICES

while causing a reduction in the imports from the Netherlands, with the consequent maintenance of prices at a higher level in July until mid-August, stimulated the Jersey growers, who exported at the rate of 40,000-60,000 cwt. per week during September, 1934; the total for the 1934 season amounted to 460,000 cwt.

Little effect on English prices can be attributed to the exports of Guernsey tomatoes; the Guernsey tomato-growing industry exported to England approximately 200,000 cwt. between 1908 and 1913 and the quality increased up to 547,000 cwt. in 1933. Guernsey tomatoes are glasshouse-grown and the bulk is ready to pick in June and July, but there are appreciable quantities in May and some in April. Production costs are practically equal to those of English growers and consequently no lowering of prices is experienced.

Conclusions.—Since its inception the tomato-growing industry has made continuous and rapid progress; the popularity of the tomato has been ever-increasing, and the industry has striven to keep pace with the demand. The depression, bringing with it a lessened demand, coupled with increased and improved imports, has proved a severe check and rendered the industry unstable.

As Mr. G. K. Chesterton recently pointed out, a man who reads only newspapers from day to day without reference to history, will never be able to predict the future; so, the careful recording of statistics—prices, supplies, imports and so on—when these have accumulated over a sufficient number of years, will eventually prove valuable data from which the best direction for development may eventually be determined.

REPORT ON THE WORK OF THE EDUCATION AND RESEARCH DIVISION OF THE MINISTRY, 1933-4

I.—AGRICULTURAL RESEARCH (INCLUDING LOCAL INVESTIGATION AND ADVISORY WORK)

THE work of the Ministry under this head is mainly concerned with the administration of the series of grants that are set out in the tables appended. The general lines of this work and the arrangements for co-ordination with the Development Commissioners and with the Agricultural Research Council were explained particularly in the report for 1932-3.* Briefly, the Ministry is responsible for the administration of the grants, the Development Commissioners have the duty of making recommendations to the Treasury as to the monies to be provided for agricultural research out of the Development Fund, and the Agricultural Research Council acts as an advisory body, primarily from the scientific point of view, both to the Development Commissioners and to the Ministry.

State expenditure on agricultural research is met mainly from the Development Fund, but, as indicated in Table I, which summarizes the expenditure in the financial years 1933 and 1934, certain items are provided directly from the Ministry's Vote. In addition, the Agricultural Research Council has a small fund out of which it makes grants for agricultural research after consultation (as regards England and Wales) with the Ministry. These grants are not covered by this report, though the Ministry acts on behalf of the Council in the administration of certain of them.

The expenditure on agricultural research and advisory work in England and Wales during the financial year 1934 amounted to approximately £282,300 as against £287,400 in the previous year. The latter sum, however, included Government contributions to the Imperial Agricultural Bureaux, the Imperial Institute of Entomology and the Imperial Mycological Institute, amounting to £5,125, which have been borne on the vote of the Dominions Office since April 1, 1934.

* This JOURNAL, Vol. XLI, No. 7, October, 1934, pp. 640-657.

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The financial position continued to impose restrictions on the development of research. It was, however, possible to provide for certain small extensions that had become urgent. Additional funds were also necessary to restore, from July 1, 1934, one-half of the economy cuts in the salaries of research and advisory workers, which had been in operation since 1931. These increases in expenditure were counterbalanced by reductions in other directions—on capital schemes and by the termination of certain schemes of research—so that the total level of expenditure in the previous year was not exceeded.

The greater part of the agricultural research work in this country is carried out at Agricultural Research Institutes, and the block grants to these institutes are the largest individual items of expenditure. Next in magnitude are the grants for the upkeep of the advisory service; the remainder of the expenditure is on various special schemes of research and investigation. Notes on each item are given in the following paragraphs.

Grants to Research Institutes.—The Agricultural Research Institutes, with few exceptions, are not State institutions; some are attached to universities, others are independent units with their own governing bodies. Their work is aided by annual “block” grants. The grants for the academic year 1933-34 are detailed in Table II, with comparative figures for the previous year. No account of the investigations carried out at these institutes will be given here. It is to be found, together with reports on the work aided by the other grants mentioned in this report, in a volume published annually under the title “Reports on the Work of Agricultural Research Institutes, and on certain other agricultural investigations in the United Kingdom.”

No new schemes of capital expenditure could be entertained, and the small outgoings under this head during the financial year 1934 shown in Table I were in respect of a scheme authorized before the financial crisis.

Grants for Special Schemes of Research and Investigations.—All these grants are “deficiency” grants to cover actual expenditure subject to the maxima indicated in the relative Tables III, IV, V and VI. The investigations detailed in Table III are of a continuing nature and have been in progress for some years, whilst the grants in

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Table IV are normally short-term, for the elucidation of particular problems. No new grants will be added to the latter series, which is being replaced by grants from the funds of the Agricultural Research Council. The scheme for the testing of fruit trees (Table III) is now supported by the industry as well as by the Royal Horticultural Society and the State, and the grant of £485 represents less than one-third of the cost of the trials.

With the disappearance of the Empire Marketing Board on September 30, 1933, it was necessary to consider what arrangements should be made for the continuance of the investigations which had been financed by grants from the Empire Marketing Fund administered by the Ministry and had not been brought to a close by that date. After a detailed review of the work, it was decided that responsibility for the continuance of the investigations—with one exception—should be assumed by the Home Government, and they are now maintained out of the Development Fund. The exception was the grant for the home expenses of the overseas grassland adviser who was centred on the Welsh Plant Breeding Station, Aberystwyth; the demand for the assistance of this officer overseas has not been renewed.

The grants set out in Table V are for minor investigations, often outside the normal scope of research institutes, etc., and frequently initiated by the Ministry for the solution of problems with which it is concerned administratively; for instance, the fruit pulp and jam investigation at the Long Ashton Research Station, Bristol University, arose out of the Ministry's activities in the marketing field.

Local Investigation and Advisory Work.—The rôle of the specialist advisory officers who comprise the Advisory Service was explained in the Report for 1932-33. They occupy an intermediate position in the scheme of agricultural education and research, linking up with the Research Institutes on the one hand and with the County Educational Staffs on the other; it is one of their main functions to pass on to the latter, and through them to the agricultural community, the practical advances in agricultural science resulting from research work. The service is organized in thirteen provinces covering the whole of England and Wales, and the advisory officers in each province are part of the staff of the University Department of Agriculture or Agricultural College which is the advisory centre for the

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province. The grants detailed in Table VII are paid to the respective universities and colleges to provide for the salaries and expenses of the workers up to the maxima indicated.

The most important development in the service during the academic year 1933/34 was the revision of the arrangements for advisory work in Yorkshire in agricultural chemistry and plant pathology. A partial service had been maintained for some years with the aid of a fixed grant from advisory funds. With the death of one of the staff of Leeds University, opportunity occurred to institute a full advisory service in these subjects, and with the co-operation of the university authorities, this was effected on October 1, 1933. Apart from the cost of this development and the normal increases due to increments of salaries, the grants for the advisory service during the academic year 1933-34 remained at practically the same level as in the previous year. Some brief notes on the work carried out by the advisers during the year are given below.

Chemistry.—The advisory chemists again report heavy demands upon their services. A second dry summer accentuated the water problem and many analyses were made, and much advice given in this connexion. Soils, of course, claimed much of the advisers' attention, as did also samples of foodstuffs, manures, insecticides, and milk. In connexion with schemes for putting unemployed men on the land, certain advisers have rendered assistance by giving lectures to the participants in the scheme. Silage problems, diseases of crops, and fertilizers for sugar-beet may be specially mentioned as requiring attention.

Entomology and Mycology.—The Advisers in entomology and mycology are called upon for advice on the prevention and control of plant pests and diseases, and to conduct, where necessary, local investigations into control measures. The advisers work in close co-operation with the Ministry's Plant Pathological Laboratory, for which they act as intelligence officers, submitting periodical reports on the incidence of pests and diseases in their provinces. Although another hot and dry summer was on the whole unfavourable to severe attacks of insects and fungus pests, much useful work was undertaken by the advisers, and there is no doubt that substantial benefits are accruing to farmers and horticulturists from these services.

The entomologists co-operated with the Ministry's Inspectorate in a survey of potato crops, particularly in coastal districts, to ascertain if the Colorado beetle, specimens of which were discovered in the Tilbury and Gravesend districts during the summer of 1933, was present elsewhere in the country.

Economics.—The increased interest in the economics of all branches of agriculture and horticulture was reflected in the demands made on the advisory economists for expert advice on matters ranging over the whole field of agricultural economics. The advisers continued to be successful in securing the active co-operation of a large number of farmers in the investigation of local problems, and many useful pieces of work were completed.

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As was mentioned in last year's report, the fact that economic problems are often national rather than local in character has led to the adoption of the co-ordinated survey for the investigation of such problems. The inquiry into the methods of management for milk production, for which this line of attack is being employed, was continued, and certain advisers have published interesting and instructive interim reports on their results. The survey into poultry management commenced in the West Midland, North Western and Northern Advisory Provinces in the autumn of 1930 and in the Bristol Province in 1932 was also continued and further extended to include the Yorkshire Province: it is anticipated that some results of the survey will be published very shortly. Several of the officers co-operated in a survey of the willow growing industry in this country, at the request of the Ministry.

Veterinary Science.—A wider realization, by poultry keepers, of the need for advice on poultry diseases has demanded an increasing proportion of the time and attention of these officers. Amongst diseases of other stock to which attention has been given may be mentioned contagious abortion in cattle and parasitic gastritis and enteritis in sheep. In some districts diseases of swine were unusually prevalent.

Dairy Bacteriology.—The abnormally hot and dry summers of 1933 and 1934 and the consequent lack of an adequate water supply in many parts of the country led to an increase in the number of requests received by the Dairy Bacteriological Assistants for advice on the maintenance of hygienic standards of milk and milk products. Low keeping-quality milk troubles and taints were particularly prevalent, and ropiness in milk was again troublesome: it is thought that the source of ropy milk bacteria is often to be found in contaminated water supplies to which the cows have access.

Notwithstanding this increase in the work of an advisory nature and the demand made upon the Dairy Bacteriologists' time by routine bacteriological examinations of milk, many local investigations were undertaken. Several Dairy Bacteriologists experimented with the methylene blue reductase test as a means of differentiating between milk of good and bad quality; this work is being continued.

Miscellaneous Experimental and Research Work :

Research into Foot-and-Mouth Disease.—In view of the decision of the Foot-and-Mouth Disease Research Committee, endorsed by the Agricultural Research Council, to undertake immunity experiments involving the use of large animals to an increasing degree, extensive alterations were carried out in 1932-33 at the Pirbright Experimental Station. This reconstruction was completed in 1933-34. The scheme included the erection of suitably isolated compounds for large animal experiments, together with certain other improvements, in particular, the provision of adequate bathing and changing accommodation for the research staff and attendants. Additional funds were obtained for these improvements and for the enlarged scheme of experiments; the annual (maximum) grant rose from £15,000 in the financial year 1932 to £17,000 in 1933 and £16,500 in 1934.

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As in previous years the Committee's investigations were mainly concentrated at Pirbright, the work here being supplemented by laboratory studies (on small animals) at the National Institute for Medical Research. It was not found possible to continue the small animal work at the Public Health Laboratory of the University of Manchester. Towards the close of the year 1934, however, with the help of the Bureau of Animal Population at Oxford University (Department of Zoology), arrangements were made for field studies on the subject of wild animals and birds as possible agents in the transmission of foot-and-mouth disease. The work of the Committee in recent years will be fully described in its Fifth Progress Report which is due for publication in the near future.

The expenditure of the Committee in the financial year 1934 was £16,475. Salaries and wages amounted to £7,577; structural alterations at the Experimental Station, repairs, rates and farming expenses to £1,032; laboratory equipment, materials, animals and miscellaneous expenses to £7,790; Bureau of Animal Population, Oxford to £70; and the expenses of the Committee to £6. The total expenditure of the Committee from 1924, the year of its appointment, up to March, 1935, was approximately £153,500.

Flax.—The scheme, financed jointly from the Development Fund and the Government of Northern Ireland, to bulk pedigree flax seed and to carry out investigations into the possibilities of improving and cheapening the processes of fibre production, terminated with the winding up of the Flax Industry Development Society in November, 1933.

Agricultural Meteorology.—Observations were again taken at certain research stations and other centres under a scheme which has for its object the collection of data bearing on the correlation of weather and crops. The operation of the scheme is supervised by an inter-departmental committee, the Agricultural Meteorological Committee, under the Chairmanship of Sir Napier Shaw, F.R.S. In addition to the meteorological observations that were taken at all centres, standardized observations on wheat crops were taken at ten centres. Periodical reports on the progress and results of the latter, prepared by the staff of the Rothamsted Experimental Station, where the records from the centres are co-ordinated, are published in the

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Ministry's JOURNAL. Other phenological observations on selected flowers and plants were taken at twelve centres. The observations on apple trees were discontinued at the end of 1933, since it became clear that the records were not likely to lead to any useful results owing to the great discrepancies that existed between the trees at the different centres.

A meeting of observers for instruction and conference was held at the Meteorological Office in October, 1933. The papers read at the conference were subsequently circulated to all centres and to other institutes and individuals interested.

Agricultural Machinery Testing Committee.—The Committee has continued to supervise the testing of agricultural machinery on behalf of the Ministry. At the end of September, 1934, forty-nine certificates and reports and one confidential report had been issued. Certificates and reports in respect of four individual tests were issued during the year, the machines and appliances comprising a milk filter disc, a milk cooling device, a spacing drill, and a pig-weighing machine. These tests were carried out at the Institute for Research in Agricultural Engineering, Oxford University, or at the National Institute for Research in Dairying, Reading University.

The work of the Committee during the period from April 1, 1932, to March 31, 1934, is described in the Committee's Third Report issued during the year.* The methods adopted by the two research institutes mentioned, in carrying out the tests, and their experiences with the many different types of machines and appliances involved, are also briefly explained.

Sugar-Beet.—The beet sugar factories again provided funds for experimental work in connexion with this crop. As in 1933, a sum of £5,000 was allocated for a programme of education and research work during the financial year, 1934, under the supervision of a committee of representatives of the factories and of the Ministry. Grants were made for trials at the following centres, in continuation and extension of previous work:—

(1) *Variety Trials*, by the National Institute of Agricultural Botany, Cambridge, at the Institute itself and at the Institute's

* Third Report of the Agricultural Machinery Testing Committee. H.M.S.O., 1934. 3d. net.

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sub-stations at Good Easter, Cannington, Newport (Salop) and Norwich. The Institute also assisted in the conduct of trials at Selby (Yorkshire). The grant for the work was £1,140.

(2) *Machinery and Cultivation Trials*.—Grants of £300 to the Institute for Research in Agricultural Engineering, Oxford University, and £462 to the Norfolk Agricultural Station, Sprowston, were provided for work at these centres in connexion with sugar-beet machinery and cultivation. The cultivation experiments were conducted at the Norfolk Agricultural Station, which also concerned itself with assessing the efficiency of the machinery used. The Institute was responsible for suggesting and carrying out modifications in design intended to improve the working of the machines.

(3) *Manurial Trials*.—A grant of £700 was made for a programme of manurial experiments by the Rothamsted Experimental Station at that station and other centres.

(4) *Beet Molasses Pulp Inquiry*.—Grants totalling £505 were provided for further investigation into the problem of taint in milk arising from feeding beet molasses pulp to dairy-cows, at the National Institute for Research in Dairying, Midland Agricultural College and University College, Nottingham.

(5) *Continental Surveys*.

(a) *Pests and Diseases*.—With the object of securing information on the incidence of sugar-beet pests and diseases abroad, and of the preventive methods in use, a sum of £500 was set aside to enable two members of the Ministry's Advisory Service (an entomologist and a mycologist) to carry out a tour on the Continent of the various state and other institutions engaged on the problem. The findings of these officers have been published.*

(b) *Sugar-Beet and Sugar-Beet Seed Situation*.—The Director of the National Institute of Agricultural Botany paid a visit to the Continent in August, 1934, with the aid of a grant of £50.

Basic Slag Committee.—The 12th Interim Report of this Committee, relating to experiments with slags of low and high citric solubilities conducted during 1933, has been presented. During 1934, a further series of experiments was commenced under the supervision of a technical sub-committee which includes representatives of the technical side of steel manufacture, with the object of determining the value of slags of medium citric solubilities. The cost of these new experiments over a period of four years, estimated at £520 per annum, is to be met partly by the basic slag trade and partly by the Ministry in the proportion of three-quarters and one-quarter respectively.

Dried and Ground Poultry Manure.—The co-ordinated experiments designed to estimate the manurial value of dried and ground poultry manure, which were started in 1933 at Rothamsted Experimental Station and other centres, were continued in the year under review. Further experiments are proposed to be carried out over a sufficient period to enable residual manurial effects to be determined.

Electro-Culture.—The 16th Interim Report of the Electro-

* Ministry's Bulletin No. 93: "Pests and Diseases of the Sugar-Beet." H.M.S.O., 1935. Price 1s. 6d. (post free 1s. 8d.)

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Culture Committee was issued in June, 1934. It deals with the experimental work carried out in 1933, when, as in previous years, pot culture experiments were conducted at Rothamsted Experimental Station, and laboratory work at the Imperial College of Science and Technology.

Observational Trials of Wild White Clover.—A series of co-ordinated trials with a number of regional indigenous strains of wild white clover was commenced in the spring of 1934 in 28 counties in England and Wales, to determine, if possible, the persistence and value of the strains in conditions approximating to farm practice. The trials were arranged through, and are to be supervised by, the County Agricultural Organizers.

Extension Lectures.—Arrangements were again made for members of the staffs of Research Institutes, Advisory Centres and the Ministry to deliver lectures on various agricultural subjects at the request of Agricultural Organizers acting in collaboration with local branches of the National Farmers' Union. During the winter session 1933/34, 197 lectures were given by 68 workers at 132 centres in 46 counties, the average attendance being 66.

Scholarships, Fellowships, etc.—Particulars of the post-graduate research scholarships and studentships for research in animal health awarded in July, 1934, on the advice of the Agricultural Research Council, are given in Table VIII. These scholarships and studentships are awarded under the scheme described in previous reports. They are normally of three years' duration, part of which a scholar may be required to spend abroad. During the year ended September 30, 1934, eight research scholars and three students, whose appointments have been recorded in previous reports, were pursuing their studies; five were in their first year, three in their second year (one in Germany) and three in their third year (one in Sweden and one in U.S.A.).

A small provision was again made for overseas travelling grants, the objects of which are to enable agricultural research and advisory workers to travel abroad in order to obtain a closer knowledge of the progress of research and advisory work in other countries, or to attend international scientific conferences abroad. Particulars of the grants made during the financial year 1934 are given in Table IX.

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TABLE I.—EXPENDITURE ON AGRICULTURAL RESEARCH (INCLUDING LOCAL INVESTIGATION AND ADVISORY WORK) IN THE FINANCIAL YEARS 1933 AND 1934.

	1933. £	1934. £
(1) National agricultural research at Research Institutes, mainly of a fundamental and continuous character, but including also specific schemes:		
Capital expenditure	4,159*	57*
Annual expenditure	157,850*(a)	162,622*(a)
(2) (i) Agricultural research schemes, initiated by Empire Marketing Board:		
Capital expenditure	—	—
Annual expenditure	19,096†	17,467*
(ii) Contributions to Imperial Agricultural Bureaux	3,125*	— §
(iii) Contribution to Imperial Institute of Entomology	1,500*	— §
(iv) Contribution to Imperial Mycological Institute	500*	— §
(3) Special research scheme for foot-and-mouth disease	16,971*	16,475*
(4) (i) Special research schemes, national and local, of a definite character and a limited period	995*	641*
(ii) Ditto, but including some special schemes of a continuing character	2,307‡	2,622‡
(iii) Ditto, Farm Management Survey	2,050‡	1,095‡
(5) Local research and specialist advisory work	71,094*(b)	74,814*(b)
(6) Post Graduate Scholarships (Research and Training), Fellowships, etc. ..	3,146*	3,264*
(7) (i) Testing of seeds and potatoes ..	4,715‡	4,024‡
(ii) Testing of agricultural machinery ..	41‡(c)	16‡(c)
	<u>£287,467</u>	<u>£283,065</u>

* Financed from Development Fund

† Financed from Empire Marketing Fund.

‡ Financed direct from Ministry's Vote.

§ Financed from Dominions Office Vote

(a) Including expenditure on Northern and Southern poultry breeding experiments under National Poultry Institute scheme (1933, £1,205; 1934, £1,773). See Part II of this Report (Education).

(b) Including grant to Norfolk Agricultural Station (1933, £966; 1934, £987).

(c) Excess of receipts over expenditure.

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**TABLE II.—ANNUAL GRANTS TO RESEARCH INSTITUTES
FROM DEVELOPMENT FUND FOR THE ACADEMIC YEAR.**

<i>Institute.</i>	<i>1932-33.</i> £	<i>1933-34.</i> £
Soils and Crops:		
Rothamsted Experimental Station ..	26,380(23)	25,650(23)
Imperial College of Science	6,160 (5)	6,258 (5)
Cambridge Plant Breeding Institute ..	3,850 (3)	4,072 (3)
Welsh Plant Breeding Station ..	7,385 (5)	7,461 (5)
National Institute of Agricultural Botany (Administrative and Crop Improvement Branches)	4,200*	6,965*†
Horticulture:		
Agricultural and Horticultural Re- search Station, Bristol	13,830(12)	13,490(11)
Fruit and Vegetable Preservation Research Station, Chipping Campden	3,000 (2)	3,000 (2)
East Malling Research Station ..	8,355 (4)	8,398 (4)
Cambridge Horticultural Research Station	3,500 (4)	3,808 (4)
Experimental and Research Station, Cheshunt	5,050 (5)	5,116 (5)
Animal Pathology:		
Royal Veterinary College	5,100 (5)	4,931 (6)
Cambridge Department of Animal Pathology	11,870 (8)	12,180 (8)
London School of Hygiene and Tropi- cal Medicine	5,150 (4)	5,086 (4)
Animal Husbandry:		
Cambridge Animal Nutrition Institute	13,020(10)	12,250(10)
Cambridge Small Animal Breeding Institute	900 (1)	850 (1)
National Institute for Research in Dairying	14,120 (8)	14,565 (8)
Economics:		
Oxford Agricultural Economics Re- search Institute	7,780 (5)	7,590 (5)
Engineering:		
Oxford Institute of Agricultural Engineering	10,000 (5)	10,110 (6)

**TABLE III.—GRANTS FROM DEVELOPMENT FUND FOR
SPECIAL INVESTIGATIONS FOR THE ACADEMIC YEAR.**

<i>Institute.</i>	<i>1932-33.</i> £	<i>1933-34.</i> £
Testing of new varieties of fruit trees:		
Royal Horticultural Society	750*	485
Virus diseases of potatoes:		
Cambridge University	2,800	2,856
Improved management of grass land:		
University College of Wales, Aberyst- wyth	630	567
Pig husbandry:		
Harper Adams Agricultural College	730	623
South-Eastern Agricultural College, Wye		

The figures in brackets indicate the number of graded research workers.

* Year ending March 31.

† Including grants for Crop Variety Trials at Sub-stations (formerly paid separately).

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TABLE IV.—SPECIAL RESEARCH GRANTS FROM DEVELOPMENT FUND FOR THE ACADEMIC YEAR.

<i>Subject.</i>	<i>Institute.</i>	<i>Investigator(s).</i>	<i>Amount of grant 1933-34</i> £
1 Use of B.C.G. vaccine in the protection of calves against tuberculosis	Cambridge: Institute of Animal Pathology	Professor J. B. Buxton and Dr. A. S. Griffith	250
2. Soil survey work	Oxford: School of Rural Economy	G. R. Clarke	47
3. Breeding of oats for resistance to frit fly	Do.	N. Cunliffe	223
4. Broccoli breeding research	Seale-Hayne Agricultural College	F. R. Horne	160

TABLE V.—GRANTS FROM MINISTRY'S VOTE FOR MISCELLANEOUS INVESTIGATIONS.

<i>Investigation and Institution.</i>	<i>Amount of Grant.</i> £	<i>Period of Grant.</i>
Commercial production of virus-free seed potatoes: University College of North Wales, Bangor	452	Oct. 1, 1933, to Sept. 30, 1934.
Bacterial diseases of plants: Imperial College of Science and Technology	240	" "
Basic slag experiments at various centres. Rothamsted Experimental Station	200	April 1, 1933, to March 31, 1934.
Agricultural Meteorology: Apparatus, observers' courses, etc., at various stations..	284	" "
Pyrethrum trials: South-Eastern Agricultural College, Wye	5	" "
Mycological examination of tubers from indoor wart disease tests at Ormskirk: Rothamsted Experimental Station	50	Oct. 1, 1933, to Sept. 30, 1934.
Correlation of work of provincial dairy bacteriologists: National Institute for Research in Dairying, Reading	11	April 1, 1933, to March 31, 1934.
Orchard-spraying experiments: South-Eastern Agricultural College, Wye	21	" "
Field investigations of strawberry diseases: Reading University .	120	" "

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TABLE V—(contd.).

<i>Investigation and Institution.</i>	<i>Amount of Grant.</i> £	<i>Period of Grant.</i>
Investigations on sulphur dioxide in fruit pulp and jam: Bristol University	200	April 1, 1933, to March 31, 1934.
Investigations into cooking qualities of eggs: King's College of Household and Social Science ..	16	.. ..
Poultry-manure experiments at various centres.. ..	219	.. ..
Investigations on "Marsh Spot" in peas: South-Eastern Agricultural College, Wye	30	.. ..
Wild white clover trials at various centres	24	.. ..
Scientific investigation of methods of destruction of musk rats at large: Department of Zoology and Comparative Anatomy, Oxford University ..	392	August 1, 1933, to Sept. 30, 1934.

TABLE VI.—GRANTS FOR RESEARCH SCHEMES INITIATED BY THE EMPIRE MARKETING BOARD.*

<i>Institution.</i>	<i>Subject.</i>	<i>Amount of grant, 1933-34.†</i> £
Welsh Plant Breeding Station, Aberystwyth	Seed production (herbage plants)	4,384
	Overseas grassland adviser (home expenses)	589
Bristol University (Long Ashton Research Station)	Cultural conditions affecting keeping qualities of fruit	1,358
Cambridge University (Animal Nutrition Institute)	Poultry nutrition (fat formation)	399
Experimental and Research Station, Cheshunt	Virus diseases of plants	1,121
East Malling Research Station	Fruit research (with special reference to standardization of horticultural material)	7,093 (a)
National Institute of Poultry Husbandry (Harper Adams Agricultural College)	Poultry (egg and meat) production	1,795
Rothamsted Experimental Station	Virus diseases of plants	2,068

* Financed from Empire Marketing Fund up to March 31, 1934; thereafter from Development Fund.

† Accounting year of institution.

(a) Includes £204 in respect of expenses of visit of Station's plant pathologist to Canada under scheme for exchange of Empire workers in agricultural science.

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TABLE VII.—GRANTS FROM DEVELOPMENT FUND TO ADVISORY CENTRES.

Advisory Centre	Academic Year 1932-33				Academic Year 1933-34			
	General Advisory	Economics	Dairy Bacteriology	Total	General Advisory	Economics	Dairy Bacteriology	Total
Armstrong . . .	3,210	1,460	320	4,990	3,250	1,460	340	5,050
Bristol . . .	5,160	1,870	410	7,440	5,260	1,890	380	7,530
Cambridge . . .	4,490	2,070	470	7,030	4,560	2,020	490	7,070
Harper Adams . . .	*3,150	1,450	400	5,000	*3,210	1,520	420	5,150
Leeds . . .	1,900	1,050	—	2,950	2,240	1,020	—	3,260
Liverpool (Veterinary Adviser) . . .	870	—	—	870	890	—	—	890
Manchester . . .	2,210	1,460	—	3,670	2,230	1,460	—	3,690
Midland . . .	*3,130	1,460	420	5,010	*3,190	1,500	440	5,130
Reading . . .	3,560	1,540	430	5,530	3,650	1,560	450	5,660
Seale Hayne . . .	3,640	1,490	400	5,530	3,830	1,530	420	5,780
Wye . . .	4,655	1,660	500	6,815	4,710	1,700	500	6,910
Aberystwyth . . .	2,830	2,640	510	5,980	2,890	2,720	530	6,140
Aberystwyth (Grassland Adviser) . . .	850	—	—	850	870	—	—	870
Bangor . . .	5,030	—	390	5,420	5,110	—	400	5,510
Cardiff . . .	2,710	—	—	2,710	2,770	—	—	2,770

* Includes part only of the cost of the Veterinary Adviser, the College providing the remainder.

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TABLE VIII.—RESEARCH SCHOLARSHIPS AND STUDENT-SHIPS IN ANIMAL HEALTH.

Awarded July, 1934.

<i>Name.</i>	<i>Subject.</i>	<i>Institute to which assigned.</i>
<i>(a) Scholars.</i>		
F. X. Aylward	Animal Nutrition	Hannah Dairy Research Institute, Ayr, Scotland.
W. F. Darke	Agricultural Economics	Agricultural Economics Research Institute, Oxford.
J. A. Freeman	Entomology	University College, Hull.
<i>(b) Students.</i>		
D. L. Hughes	Veterinary Science	Royal Veterinary College, London.
H. Wilkinson	Veterinary Science	London School of Hygiene and Tropical Medicine

TABLE IX.—GRANTS MADE DURING THE FINANCIAL YEAR 1934 TO RESEARCH AND ADVISORY OFFICERS IN RESPECT OF ATTENDANCE AT OVERSEAS CONFERENCES, OR OF SPECIAL STUDIES ABROAD.

<i>(a) International Conferences, etc.</i> <i>Name.</i>	<i>Conference, etc., attended.</i>	<i>Amount of Grant.</i> £
Professor H. D. Kay, Director, National Institute for Research in Dairying, Reading	World's Dairy Congress, Rome, April, 1934	30
Dr. A. L. Provan, Harper Adams Agricultural College, Newport, Shropshire	World's Dairy Congress, Rome, April, 1934	30
Mr. W. Davies, Welsh Plant Breeding Station, Aberystwyth	International Grassland Conference, Zurich, July, 1934	25
Mr. A. W. Ling, Agricultural Department, Bristol University	International Grassland Conference, Zurich, July, 1934	25
Dr. R. McG. Carslaw, School of Agriculture, Cambridge	International Conference of Agricultural Economists, Bad Eilsen, August, 1934	25
<i>(b) Travelling Grants.</i>		
<i>Name.</i>	<i>Purpose of Grant.</i>	<i>Amount of Grant.</i> £
Dr. W. F. Bewley, Director, Experimental and Research Station, Cheshunt	A visit to Italy in connexion with a new strain of lettuce	25
Dr. H. Hunter, School of Agriculture, Cambridge	To study winter oat breeding and other cereal work in progress in Finland	35
Dr. K. M. Smith, Potato Virus Research Station, Cambridge	To study virus diseases of various crops in southern districts of France	10
Mr. W. M. Ware, South-Eastern Agricultural College, Wye, Kent	To study methods of growing mushrooms in U.S.A.	97
Dr. J. Caldwell, Rothamsted Experimental Station, Harpenden, Herts	To visit Department of Animal and Plant Pathology of the Rockefeller Institute, New Jersey, U.S.A.	45

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Milk Marketing Scheme: *Milk Contract Prices, 1935-36.*—The Milk Marketing Board, having failed to reach agreement with representatives of the distributive trade, prescribed on September 13 the terms of the contracts for the sale of milk by wholesale during the twelve months October 1, 1935, to September 30, 1936. The Central Milk Distribution Committee has made a formal complaint to the Minister regarding the prices and certain of the terms prescribed by the Board, and the complaint has been referred by the Minister to the Committee of Investigation for England. The Board has undertaken, as part of an agreement with the Central Milk Distributive Committee, that contracts shall be endorsed with further conditions to the effect that they shall be varied, both as regards prices and terms, if the Minister so requires after considering the Report of the Committee of Investigation, and that they will be terminable by any party to them within a prescribed period after action has been taken on the Report.

The wholesale prices of milk for liquid consumption in the new contract compared with those in previous contracts are as follows:—

Month.	1933-34. <i>All Regions except the South-Eastern.</i>		1934-35. <i>All Regions.</i>		1935-36. <i>All Regions.</i>	
	s.	d.	s.	d.	s.	d.
October ..	1	3	1	4	1	5
November ..	1	4	1	4	1	5
December ..	1	4	1	5	1	5
January ..	1	4	1	5	1	5
February ..	1	4	1	4	1	5
March ..	1	2	1	2	1	4
April ..	1	0	1	1	1	4
May ..	1	0½*	1	0½*	1	0½*
June ..	1	0	1	0	1	1
July ..	1	0	1	1	1	1
August ..	1	0	1	1	1	1
September ..	1	0	1	1	1	4
Annual price per 12 gal.	13	9½	14	4½	15	1½
	13	9½	14	4½	15	6½

The transit risk allowance on milk delivered to approved depots has been fixed at $\frac{1}{4}d.$ per gallon instead of $\frac{1}{2}d.$ per gallon as in the 1934-35 contract.

The contract makes provision for the payment of a level

* The $\frac{1}{2}d.$ in May represents the purchaser's share of a joint contribution of $\frac{3}{4}d.$ per gallon for milk publicity.

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delivery premium of 1d. per gallon for daily deliveries of an exact quantity of milk, and the previous premium of $\frac{1}{2}$ d. per gallon for a maximum daily variation of 10 per cent. is continued. Provision is also made for semi-wholesale and accommodation sales.

Appropriate minimum retail prices are prescribed at the same figures as in the previous contract, but the new contract allows sales of milk "at the farmhouse door" (i.e., sales to a retail customer who calls at the premises where the milk is produced) at 1d. per quart less than the appropriate minimum price.

The prices of milk used for manufacture are contained in a supplementary certificate signed by the Chairman of the Board. The prices of milk for manufacture into cheese and butter are:—

<i>Product.</i>	<i>Price per gallon.</i>
Cheese (other than soft curd cheese and cream cheese) manufactured from milk delivered in the months of October, 1935, to February, 1936, and in September, 1936.	A sum equal to the average less a sum of 1 $\frac{3}{4}$ d. of (1) the average price per lb. for the previous month of Finest White New Zealand cheese, and (2) the average of (a) the average price per lb. for the previous month of Canadian cheese (excluding old and exceptional quotations) and (b) the average price per lb. for the previous month of Canadian cheese New Season's make.
Cheese (other than soft curd cheese and cream cheese) manufactured in other months.	The average price per lb. for the previous month of Finest White New Zealand cheese less a sum of 1 $\frac{3}{4}$ d. per lb.
Butter manufactured in the County of Cornwall.	4 $\frac{1}{4}$ d.
Butter manufactured elsewhere	3 $\frac{3}{4}$ d.

The prices of milk manufactured into other products are the same as in the previous contract except that the price of milk for tinned cream has been increased by 1d. to 6d. per gallon, and chocolate is now included among "other products" for which the price is 9d. per gallon. A new category has been provided for bottled cream at a price of 7 $\frac{1}{2}$ d. per gallon of milk.

A premium of 1d. per gallon over the above-mentioned prices is payable on milk used for manufacture in the Metropolitan Police District or the City of London.

Pool Prices for August, 1935.—The wholesale "liquid" price for August, 1935, was 1s. 1d. per gallon in all regions, the same as in July. Pool prices and rates of producer-retailers' contributions for the month are given below, with comparative figures for July and also for August, 1934, when the regional liquid price was 1s. 1d. per gallon in the

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south-eastern region and 1s. per gallon in all other regions:—

Region	Pool Prices (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	August	July	August	August	July	August
1935	1935	1934	1935	1935	1934	
Northern ..	10	10	10 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$
North-Western ..	10	9 $\frac{3}{4}$	10 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$
Eastern ..	10 $\frac{1}{2}$	10 $\frac{1}{2}$	11	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1
East Midland ..	10	10	10 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$
West Midland ..	9 $\frac{3}{4}$	9 $\frac{1}{2}$	10 $\frac{1}{2}$	2 $\frac{1}{2}$	3	1 $\frac{3}{8}$
North Wales ..	10	9 $\frac{1}{2}$	10 $\frac{1}{2}$	2 $\frac{1}{2}$	3	1 $\frac{3}{8}$
South Wales ..	10 $\frac{1}{2}$	10	10 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$
Southern ..	10 $\frac{1}{2}$	10 $\frac{1}{2}$	11	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1
Mid-Western ..	9 $\frac{3}{4}$	9 $\frac{1}{2}$	10 $\frac{1}{2}$	2 $\frac{1}{2}$	3	1 $\frac{3}{8}$
Far-Western ..	9 $\frac{3}{4}$	9 $\frac{1}{2}$	10 $\frac{1}{2}$	2 $\frac{1}{2}$	3	1 $\frac{3}{8}$
South-Eastern ..	10 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$
Unweighted Average	10.05	9.89	10.77	2.53	2.71	1.24

Producer-retailers who qualified were credited with level delivery premiums at the rate of $\frac{1}{2}$ d. per gal. 9,003 accredited producers received a premium of 1d. per gal. in addition to the pool price. A levy of $\frac{1}{4}$ d. per gal. was made for general expenses.

Sales on wholesale contracts were as follows:—

	August, 1935 (estimated) gal.	August, 1934 gal.
Liquid	45,033,627	44,497,922
Manufacturing	25,619,893	18,123,528
	70,653,520	62,621,450

Percentage Liquid Sales	63 74	71 1
.. Manufacturing Sales	36 26	28 9

The average realization price of manufacturing milk during August was 5.73d. per gal., compared with 5.38d. per gal. for July. Milk manufactured into cheese by farmhouse cheesemakers amounted to 1,843,149 gal., compared with 2,149,413 gal. in July, and 3,004,916 gal. in August, 1934.

Farmhouse Cheese.—The terms of the agreement for the 1935-36 contract period between the Milk Marketing Board and farmhouse cheesemakers are similar to those in the 1934-35 contract, but the agreement is now applicable to registered producers with 6 or more milch cows. During the contract year (October, 1935-September, 1936), farmhouse cheesemakers must undertake to convert into cheese all the milk they produce in at least six months, which must include the months May to September, 1936. The Board will make payments to producers at the following rates per gallon in respect of all milk so converted:—

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Milk manufactured into:—
Caerphilly or
Hard Cheese. Soft Cheese.

October, 1935, to April, 1936 ..	5½d.	5d.
May to September, 1936 ..	5d.	4d.

These payments represent an increase of about 1d. per gal. on the terms of the current contract. In addition, producers who qualify under the Accredited Producers Scheme will be entitled to receive the guaranteed quality premium of 1d. per gal.; but they will be required to pay each month, in common with other registered producers, the general expenses levy and the guaranteed quality premium levy.

Pigs and Bacon Marketing Schemes : Pig Prices for September.—Contract prices for pigs further declined in being 11s. per score compared with 11s. 4d. for August. While there was a further slight fall in the feeding stuffs ration, the decline in pig prices was mainly due to the fall in the ascertained bacon price from 92s. 4d. to 88s. 9d. per cwt. The basic price is exclusive of the curers' contribution of 1d. per score towards insurance and 2d. per score towards level delivery bonuses on pigs delivered during the first four months of the year.

Bacon Development Scheme.—The Bacon Development Scheme, particulars of which were published in the last issue of this JOURNAL,* came into force on September 7, and the Development Board, which will administer the Scheme has now been established. The constitution of the Board is as follows:—

Chairman and two other members appointed by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland:

Lord Portal, M.V.O., D.S.O., D.L., J.P., Chairman.
 Sir Robert Blyth Greig, M.C., LL.D., D.Sc.
 Sir Francis Theodore Boys, K.B.E.

Four members appointed by the Bacon Marketing Board:

Mr. A. E. Marsh (Chairman of the Bacon Marketing Board).
 Mr. J. F. Bodinnar (Vice-Chairman of the Bacon Marketing Board).
 Mr. H. Martin Lewis.
 Mr. G. F. Spear.

Four members appointed by the Pigs Marketing Board:

Mr. J. A. Fox (Chairman of the Pigs Marketing Board).
 Mr. R. Rowland (Vice-Chairman of the Pigs Marketing Board).
 Capt. E. T. Morris.
 Mr. J. H. Wain.

Potato Marketing Scheme : Marketing Co-ordination Plans.—One of the problems with which the Potato Marketing Board are attempting to deal is that of price cutting by distributors, a practice which in the opinion of the Board

* Pages 571-576.

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seriously affects the prices returned to producers. The problem first presented itself to the Board in an acute form in Scotland during the summer of 1934, and to meet the situation the Board in July, 1934, inaugurated an experiment, in co-operation with distributors in the Glasgow area, in the voluntary regulation of margins. The experiment proved successful and it was soon extended to other centres in Scotland and to Plymouth.

As these experimental plans operated satisfactorily, the Board in January, 1935, set up a Committee to prepare a scheme which could be applied to the whole country. The plan formulated by this Committee is an elaboration of the original Scottish scheme and is, in outline, as follows:—

1. " Markets Committees " to be set up in defined areas representing the authorized merchants established and trading in the area.
2. Minimum prices, below which specified kinds of potatoes shall not be sold to retailers, to be recommended by these Committees from time to time. The minimum prices to be arrived at by reference to growers' delivered prices, and to cover use of bags and delivery to shops, and to rise or fall in sympathy with the market situation.
3. The Committees' minimum prices to be notified to and observed by all authorized merchants trading in the area.
4. Authorized merchants in any area who persistently ignore the plan to be reported to the Board by the Markets Committees, who may also recommend to the Board reforms in market practices.

It has been the policy of the Board to secure the agreement of organizations representing wholesale distributors in all important consuming areas, and thus gradually to bring the scheme into operation throughout the country. In addition to the original developments in Scotland and in Plymouth, the plan has been put into operation in the Tees-side area, Cumberland, Liverpool, Bolton, Blackburn, Burnley, and in many other Lancashire towns. In other important areas, including the Manchester, Sheffield, Leeds and Bradford, Birmingham, Newcastle, North Lancashire, Coventry and North Staffordshire districts, it has been decided to adopt the plan from the commencement of the 1935-36 main crop season.

An Experiment in the Distribution of Potatoes at Bishop Auckland, February-March, 1935.*—I. The Potato Marketing Board have recently published a Report on their experiment in the distribution of potatoes at specially low prices to the unemployed at Bishop Auckland.

* Potato Marketing Board: Miscellaneous Publication No. 2.

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2. In planning their experiment, the Board were anxious to avoid injuring the interests of distributors. The problem was to discover if the trade—not the Board—could find new outlets for sales at differential prices; and if price differences could be justified economically on the basis of the difference in services rendered.

Bishop Auckland has a population of about 19,000, including that of some neighbouring villages; approximately 5,000 are insured male workers and of these 2,400, representing, with their dependents, 33 per cent. of the population, are unemployed.

3. To this section, numbering 6,236 people, potatoes were made available for 8 weeks covering February and March, 1935, at a price of 4*d.* per stone, compared with the prevailing price of 7*d.*—itself abnormally low. Those who wanted cheap potatoes were required to fetch them in their own containers from a central warehouse, open two days a week, and to pay for them in cash. To avoid injury to local retailers who collaborated, arrangements were made whereby they obtained, in respect of potatoes sold by the Board to their customers, a sum of 1*d.* per stone as compensation for loss of trade.

4. In order to confine distribution to the unemployed, and to provide a means of checking the amounts due to each retailer, the collaboration of the local Employment Exchange was obtained in issuing, to unemployed persons only, vouchers which, when stamped by a retailer, entitled them to a specified quantity of potatoes at the reduced price, up to a weekly maximum depending on the number of their dependents as follows:—

Man, wife and 1 child	..	1½	stones per week
Man, wife and 2-4 children	..	3	„ „
Man, wife and 5-8 „	..	4½	„ „

5. During the experiment 21,000 vouchers were issued from the Exchange, 19,400 were used (a significantly high figure) and 182 tons of potatoes were sold. Over 187 tons had been bought for the purpose and so the loss on weight was over 5 tons. No special steps were taken to prevent vouchers or potatoes from being negotiable.

6. The Report states that the total expenditure of the Board was £297, of which £111 represented costs of warehouse distribution, and £121 compensation to retailers; the balance was represented by loss in weight and by selling at 53*s.* 4*d.* per ton potatoes that had cost the Board 59*s.* 0*d.* per

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ton delivered warehouse to buy. (The latter figure included 10s. per ton to wholesale merchants for their remuneration, collection, delivery and use of bags.)

7. The important feature of the experiment was its influence on weekly retail sales, which may be summarized as follows:—

Before experiment	.. .. .	16 tons, 12½ cwt.
During experiment	at shops	9 tons, 18½ cwt.
	at warehouse	22 „ 15 „
After experiment	.. .. .	13 „ 14 „

This means that normal sales in the retail shops fell to 60 per cent. and, after making a deduction for the excess purchases that were made in the last week of the experiment to get the benefit of it, that the quantity sold at the warehouse represented 131 per cent. of total sales prior to the experiment, and also that the total sales (shop and warehouse) represented 191 per cent. of sales before the experiment.

If, in addition, the whole reduction in April sales is attributed to the experiment, the allowance for this and for the loss of trade sustained by the fish friers would still leave the total increase in sales at 69 per cent. This is probably a conservative estimate of the total increase, because during the spring a seasonal decline in potato consumption commences.

8. Actual distribution costs (including loss in weight) incurred by the Board, amounted to only 14s. per ton, or a fraction over 1d. per stone. Allowing for the fact that certain of the expenses were abnormal, owing to the temporary and experimental nature of the scheme, the distribution costs were estimated by the Board at only 0.8d. per stone. On the other hand, the supervision of the experiment was carried out voluntarily.

9. The Report states that from general inquiries made it was discovered that no change in diet had occurred, except for the additional consumption of potatoes, but adds that more exact investigation should be made on this point in any future experiment.

10. The effect upon the individual retailer is tabulated by dividing the retailers into three classes, numbering 7 large, 11 medium, and 19 small retailers. The increase in the total sales (i.e., the amount sold in shops, and against vouchers stamped for, and actually collected at the warehouse) is respectively 60 per cent., 108 per cent. and 167 per

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cent.; showing that it is the smaller retailers who secured the greatest increase in consumption amongst their customers. There were, however, exceptions. It was the customers of the smaller retailers who showed the biggest increase in their shop purchases after the experiment was over.

11. Associated with the experiment was a certain amount of publicity and advertising. Each recipient at the warehouse received a pamphlet on cookery, free of charge.

12. One conclusion that can be drawn from the experiment is that even in a town with a high proportion of low-level incomes, and at a time when the price was low, consumption of potatoes is not inelastic, but will respond to a price reduction. It shows, moreover, that if it is decided to dispose of cheap surplus supplies without disturbing the existing price structure, machinery can be devised to this end, leaving unimpaired the retailers' contact with his customer.

The Report points out, however, that cut prices mean a smaller return to the producer and that in this instance the loss was shouldered by the Board themselves. If a scheme of this description were contemplated on a larger scale the Report concludes that retailers might be able to sell a proportion of their goods at specially low prices by divorcing most of their customary services from those goods, while the producer would be glad to realize for his surplus any price higher than the value to him of any alternative outlet such as manufacture or stock-feeding on the farm. Such special sales could not, however, safely be undertaken without the supervision of a Marketing Board in order to ensure effective safeguards against damage to normal sales, which are the main consideration. Given those safeguards, the Report states that distribution and retail service might be separated to meet special requirements with benefit alike to retailer and producer.

Hops Marketing Scheme.—The Hops Marketing Board have fixed October 7 as the last day for tendering to the Board hops of the 1935 season. After that date the Board may refuse to accept delivery of new season's hops.

The Board have appointed eleven firms of hop factors to act as their agents for the 1935 crop and have announced that it will be necessary for producers to employ one of these agents to pass their hops into the Board. An advance of

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£5 per pocket (1½ cwt.) of sound quota hops will be made by the Board through their agents as soon as possible after the producer's entire growth has been received into an approved warehouse.

Milk Act, 1934.—Below is a summary of the advances and payments made to date by the Ministry under this Act.

(a) Advances in respect of manufacturing milk.

Section.	Paid to	In respect of Milk	Gallons.	Amount. £
1	Milk Marketing Board for England and Wales	Manufactured at factories other than the Board's	222,518,691	1,232,055
2	Do.	Manufactured by the Board ..	187,331	1,105
3	Do.	Made into cheese on farms ..	17,871,215	109,130
6	Government of Northern Ireland (by direction of the Treasury)	Used for butter and cream at registered creameries . .	24,854,631	212,771
			Total .	<u>£1,555,061</u>

Note.—Advances are payable in respect of milk produced and manufactured during the two years ending March 31, 1936. They are contingently repayable during the succeeding two years.

(b) Contributions under Section 11 towards the expenses of the Milk Marketing Board in carrying out approved arrangements for increasing the demand for milk.

(i)	Milk-in-Schools Scheme (16,697,486 gallons) ..	£344,254
(ii)	Initial Publicity for Milk-in-Schools Scheme	<u>£2,000</u>
Total ..		<u>£346,254</u>

Note.—Contributions under this Section are limited to £1,000,000 of which £860,000 has been allocated to England and Wales. Further arrangements already approved and in operation are the nutritional survey supplementing the Milk-in-Schools Scheme, and a General Publicity Scheme (mainly Press and Poster) towards the cost of which Exchequer contributions are estimated not to exceed £5,000 and £30,000 respectively.

Cheese Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 3.93d. per lb. for the month of September.

Milk (Farm Cheese-Milk) Order, 1935.—The Minister made an Order on September 3, 1935, under Section 3 of

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the Milk Act, which Order provides that no sum shall be payable under that Section to the Milk Marketing Board for England and Wales in respect of milk used by a registered producer in manufacturing cheese at a farm during the month of October, 1935, or during any subsequent month unless the Board satisfies the Minister that the producer had in his possession not less than six milch cows at the beginning of the month in which the milk was used.

This Order amends the Order issued on August 27, 1934, which specified eight as the minimum number of milch cows which a registered producer must possess for the purposes of Section 3 of the Act.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by September 10 to £3,643,828. These payments were in respect of 1,530,410 animals, the average payment per beast being £2 7s. 7d. Since August 6, 1934, some 418,000 animals have been marked at ports (excluding Northern Ireland) under the Marking of Imported Cattle Order.

Wheat Act, 1932 : *Sales of Home-grown Wheat—Cereal Year 1935-36.*—Certificates lodged with the Wheat Commission by registered growers during the period August 1 to September 6, 1935, cover sales of 1,848,112 cwt. of millable wheat, as compared with 1,258,348 cwt. in the corresponding period (to September 7) in the last cereal year.

Ascertained Average Price of Home-grown Millable Wheat in 1934-35.—After consultation with the Wheat Commission the Minister has made the Wheat (Ascertained Average Price) Order, 1935, certifying and prescribing that, during the cereal year ended July 31, 1935, registered wheat growers sold 35,920,000 cwt. of millable wheat of their own growing at an average price of 4s. 10-873d. per cwt.

Final Deficiency Payment to Wheat Growers for 1934-35.—The Wheat Commission dispatched cheques on September 13 to 93,304 registered growers, in respect of the final payment of deficiency payments for the cereal year 1934-35. The aggregate amount involved was approximately £1,639,000, but after adding 1,140 further pay-

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ments in relation to which, for various reasons, the Commission have had to investigate the title of persons claiming the deficiency payments, the amount disbursed in this final payment will be about £1,675,000. This will bring the total deficiency payments for the year, including the advance payments made in December, 1934, and in February, April and July, 1935, to approximately £6,813,000, or an average of just over £72 per registered grower. The deficiency payment for 1934-35 is equivalent to 3s. 9.55*d.* per cwt. (approximately 17s. 1*d.* per quarter) in respect of all sales of wheat credited to growers for that year, from wheat certificates delivered to the Wheat Commission.

Approximately 35,900,000 cwt. of millable wheat were sold by the 94,444 growers who have qualified for deficiency payments, and 212,440 wheat certificates relating to the sales of this wheat were delivered to the Commission.

Sugar Beet: *British Sugar (Subsidy) Act, 1935.*—In accordance with the Schedule to the above Act the Minister, after consultation with the Treasury, has made the British Sugar (Subsidy) Rules, 1935, for determining the "relevant market price" in relation to sugar manufactured in any week from home-grown beet for the purpose of calculating the subsidy payable during the period between August 31, 1935, and September 1, 1935. The Rules have been issued as Statutory Rules and Orders, 1935, No. 908, and copies can be obtained from any bookseller or from H.M. Stationery Office, price 1*d.*

National Mark Canned Fruit and Vegetable Scheme.—For the third year in succession adverse weather conditions have affected the output of canned fruit and vegetables. The severe frosts in May resulted in short supplies of raw fruits and consequently in very reduced packs of all varieties of canned fruits. Some factories did not operate at all whilst a number of others packed only nominal quantities. The packs of fresh-picked peas and other vegetables, however, were not so much affected. One satisfactory feature of the season was that the very small new packs led to the clearance of carry-over stocks from factories and wholesale and retail premises.

The amount of sampling done during the season was limited by the reduced output. Up to the end of August, 1,000 samples of fruit and vegetables were critically

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examined, and the reports on these, and on samples examined during factory inspections, indicate that, apart from the small size of some strawberries, the high standards of quality attained in previous years have been well maintained.

Since the inception of the scheme, additional requirements, designed to secure the packing of a product of high standard, have been gradually introduced, and the conditions attached to the quality control of canned fruit and vegetables may now be regarded as approaching their final form. Statutory minimum sizes have been prescribed this season for certain canned fruits, while, as indicated in the June number of the JOURNAL, increased attention has been paid to time temperature equipment at factories. On the recommendation of the National Mark Canned Fruit and Vegetables Trade Committee, and with the concurrence of the Cannery Association, thermometers and pressure gauges have to be tested annually, and a certificate to this effect has to be sent to the Ministry by each authorized canner by May 31 each year. This requirement involves no actual change in general factory practice, but the submission of an annual certificate will ensure that the responsibility for testing and, where necessary, rectifying these instruments will not be overlooked.

Demonstrations at Shows and Exhibitions.—Fruit-grading demonstrations, as well as exhibits of National Mark produce, will be staged at Marden on October 9 and 10, and at the Imperial Fruit Show, Cardiff, from October 25 to November 2. At the Dairy Show, which is to be held at the Royal Agricultural Hall from October 22 to 25, the Ministry's exhibit will consist mainly of National Mark Dairy produce—cheese, butter and eggs. A working egg-grading demonstration will be staged at the North London Exhibition at the Alexandra Palace from October 9 to 26.

Canada: Dairy Products Marketing Equalization Scheme.—The recent Act amending the Natural Products Marketing Act, 1934, authorized any scheme of regulation to provide solely for equalization to any extent, as between the producers, of the returns received from the sale of the regulated product. Under this provision, a scheme, proposed by the Minister of Agriculture and approved by the Governor General in Council on July 20, 1935, "contemplates the equalization to some extent" of the returns from the marketing of milk and milk products produced in Canada.

The regulated product is factory-made cheese of the cheddar type, but the scheme may be extended by the Governor General in Council

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to include any other dairy product. The Dominion Marketing Board is empowered to regulate the delivery of milk to the factory and the manufacture of the regulated product, and to determine the grade or grades of the regulated product eligible to share in the equalization fund. The scheme is to be administered by the Dairy Branch of the Department of Agriculture. The object of the scheme appears to be the encouragement of cheese production, which has been declining in Canada; accordingly, a bonus of about $1\frac{1}{2}$ or $1\frac{1}{4}$ cents per pound of cheese is to be paid out of a Federal Fund. It is expected that the present arrangement is provisional only, and that the dairy industry may be able to set up its own scheme shortly.

Decline in Beef Consumption in Austria.*—The Vice-President of the "Committee of Action for Increasing Consumption of National Agricultural Produce" advances the view that the so-called 'flight from beef' is due to the fact that the household of to-day has, by force of circumstances, undergone a certain simplification. He suggests that the modern housewife cannot devote the same time and care to the preparation of food as formerly, and that beef dishes in respect of the time and cost of preparation are expensive. She accordingly resorts to other kinds of meat that can be prepared for the table in a fraction of the time and with less labour. Moreover, the quality of beef in Austria has somewhat deteriorated in recent years. Although a piece of good beef is still the best kind of meat for consumption, in spite of its cost, this cannot be said of the quality of beef available to the great mass of the population. The poorer the quality, the greater is the cost of preparation and the less satisfactory the result. The increasing demand for pig meat is due to the fact that the majority of the animals are under one year old when slaughtered, and that methods of breeding and feeding result in tasty meat that can be prepared for the table in homes and restaurants in about a third of the time required for beef, and less goes in waste.

The profitable disposal of the products of the cattle raisers is accordingly regarded as the most vital problem in Austrian agriculture to-day. Owing to the decline in consumption of beef, only 1,600 to 1,800 head of cattle are now required to cover Vienna's weekly requirements, as against 4,000 to 5,000 before the war. The collapse of the cattle market and enormous losses to agriculture were only prevented by the introduction of Government measures for the regulation of the cattle industry. Although a fall in price was avoided, the problem of the profitable sale of the surplus cattle was not solved. To relieve markets, cattle were bought by the Government and the meat partly distributed in winter relief, partly preserved and partly used for the manufacture of feeding cake. This was only a temporary alleviation, and as export prospects are still uncertain, other possibilities for increased home consumption must be sought.

Criticism of International Wheat Control.*—Mr. Alonzo E. Taylor, one of the Directors of the Food Research Institute, Stanford University, California, examines in the June issue of "Wheat Studies," published by the Institute, the prospects of an international solution of the wheat problem. His conclusions, which are extremely pessimistic, are to the effect that wheat is "inherently unadapted to international control," and he is extremely sceptical of any extension of regulation on a world basis. He bases his opinion on the following facts:—

1. In order to attain an international adjustment of the production and consumption of wheat, it is essential to secure reliable estimates of the harvest and of the requirements. Experience has shown that such estimates are extremely hazardous and

* Note provided by the Market Supply Committee.

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that the published figures rarely agree amongst themselves or with the final results.

2. The problem, moreover, is not one merely of quantities, as with metals. There are many sorts of wheat and the utilization of each is different. This complicates the allocation to each country of a simple global figure.
3. Even supposing these difficulties surmounted, there remains the problem of the fixation of the requirements of the importing countries. These are dependent upon the previous imports, average per capita consumption, estimated harvest and import quotas. Thus a large number of unknown factors enter into the problem.
4. Moreover, the principle of the reduction of the sown area has so far nowhere been admitted, except in the United States. The various methods of realizing such reduction are then examined: persuasion, subsidies, compulsion, State purchase of land. The agreement of the different Governments upon the choice of a sole method seems to Mr. Taylor problematical, and he mentions a further one upon which, however, he does not insist, namely, a fall in price, consequential bankruptcy of producers, and forced sale of their farms.
5. With regard to the control of prices, Mr. Taylor is doubtful as to its practicability in view of the divergence of types and qualities, but above all owing to the difficulty of determining the origin of wheat emanating from five or six exporting countries and entering ten or twelve importing countries. He points out in this connexion that it is already extremely difficult to differentiate at the European ports between United States and Canadian wheat. Similarly, the control of stocks will, in practice, be almost impossible in the absence of complete and reliable statistics.
6. Finally, Mr. Taylor maintains that in any event international regulation of the wheat market will be without the slightest chance of success as long as international monetary stabilization has not been achieved. Even if this were attained, the lack of discipline in importing and exporting countries would prevent the execution of any agreed plan.

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Sheep.—By the end of September the breeding flock of the average West Country farm has been made up to strength, one or more lots of purchased ewes having been added to those of the home flock that were considered suitable for keeping on. Except where early lambs are produced, the tups are put with the lowland ewes on or about October 1. There is a little breathing space in which to consider whether the ewes were well bought—perhaps one was in too much of a hurry buying one lot, but made up for it by getting another lot very cheaply. A buyer new to farming, but with a strong desire to be “keen” became unpopular in one market because he reduced the bidding from units of 6*d.* to 3*d.*; he argued that 3*d.* on 100 sheep would more than pay his expenses for the day. At that time, however, he had not the experience to know that, as often as not, he started the bidding from 2*s.* to 3*s.* too high. A keen buyer is a man of good judgment, knowledge and experience.

With produce having a short selling season, prices are apt to fluctuate rather much. Turkeys provide the extreme instance; the birds may be unreasonably low one day and be at famine prices a day before Christmas. The sales of mountain ewes, which generally extend over a month, are subject to the same uncertainties and fluctuations, though to a lesser extent. In some years early buyers are fortunate, and in others they may regret their eagerness. In the long run, the man who buys ewes every year from the same farm, or within the same group of farms, is least likely to make mistakes. Mountain sheep of the same age, breed and condition vary much in size. It is not easy to judge the size of sheep, nor indeed of anything, unless they are compared with some that are known to us, or with several others. The Welsh Mountain sheep of the College Farm are about as large as any of this breed kept on the mountain, weighing about 70 lb. in breeding condition. A breeder of experience who happened to be at the farm one day, however, asked why such a small type of Welsh ewe was bred! The sheep probably weighed about 15 lb. more

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than his, but there was nothing with which to compare them, and he had not handled them up to the moment of making this remark.

The tups used in North Wales for crossing with Welsh Mountain ewes for fat lamb production are mostly Southdown, though Wiltshire Horned, Border Leicester, Ryeland, etc., are also much used. In Anglesey, the Wiltshire Horned is the predominant breed of ram, and is much better known there than in its native county. According to a survey carried out in 1927, 80 per cent. of the rams used in Anglesey were of this breed, while in Flintshire there was less than 1 per cent. of Wiltshires, but more than 50 per cent. of Southdowns and 15 per cent. of Border Leicesters. Experiments extending over 15 years have been carried out in North Wales with the object of finding the most suitable breed of ram for crossing with the Welsh ewe for fat lamb production. The detailed results would not perhaps interest readers outside this district. It may be said of these results, however, as of those of similar trials in other parts of Britain, that there is not a particular cross which is best under all conditions. Type of ewe, grazing conditions, and the type of carcass in demand are some of the factors that affect the choice of ram. On the whole, the Southdown cross proved the most successful. The lambs did not grow to the same weight as those by Border Leicester or Wiltshire rams, but they realized the same price. The compact, well-covered carcass of the Southdown is favoured by most butchers. One need only examine the results of the Carcass Competition of the Smithfield Club to realize that the Southdown carcass is considered by the London and provincial butchers to be the one that is nearest to their ideal.

The tups are not put with the mountain flocks until late October or November, since lambing before April would be a great disadvantage; to those unacquainted with mountain grazing tupping in November and shearing in July appear strange! Barrenness is a factor that affects the profits of many hill farmers, and is mainly caused by tups failing to find the ewes on large tracts of mountain; to add to the difficulty the heat period of the ewes is shorter than it would be under lowland conditions. In well-managed flocks the sheep are confined to smaller areas during the tupping season. As a result of a survey carried out by White and Fraser Roberts (*Welsh Jour. Agric.*, 1927), it was estimated that the per-

centage barrenness averaged 5 in the mountain and 2 in the lowland flocks; in some flocks, of course, the proportion of barren ewes was much higher. In a Scottish hill farm, rising to 2,000 ft., under the control of the Rowett Institute, there were only 67 lambs born per 100 ewes that had run with the tups; this referred to the season preceding the experimental work. The result was not considered exceptional in the neighbourhood. The low birth rate was due, not only to barrenness, but to the high death rate amongst the ewes (11 per cent.) and also, perhaps, to abortion. It was impossible to find how many ewes were truly barren, and how many were barren owing to abortion. We sometimes grumble at the price of store sheep from the mountain, thinking of the low rent and labour costs of the hill farmer. We must not forget that the number of lambs surviving at castration time is more often below 90 per 100 ewes than above; also that the ewes do not lamb until they are two years old, and that they have probably spent their first winter on hired grazing, costing about 7s. per head.

In mentioning barrenness caused through rams failing to find the ewes, one may be permitted to mention an extreme instance that occurred a few years ago on a South American ranch, resulting in the dismissal of the manager. Forty pedigree Southdown rams, imported from England, were let out without taking the precaution of seeing that they found the flock; not a single lamb was obtained by these rams.

Cattle.—The results of the grazing season can now be reviewed. Apart from the price question, the drought in the latter half of the season was the main concern of most graziers. Those who bought forward stores in early spring, for finishing on grass by about the middle of July, were favoured by this year's growing conditions. In the areas where store cattle are raised, general drought conditions affect the breeders indirectly. In North Wales, for example, the proportion of land that has suffered acutely from drought is not large, but the breeders feel the pinch because scarcity of autumn and winter food in England means low prices for store cattle.

"Husk" reduces the profits of many who graze young cattle. In a few instances the trouble may attain such severity that some of the animals develop pneumonia and die. In most cases, however, the animals simply have the

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characteristic cough; one must bear in mind that affected cattle cannot thrive as they should. If a buyer of autumn stores has been once "bitten" he takes note of the coughing; if the cattle are in a field, causing them to run a short distance will soon show up the degree of infestation. Coughing begins in August and gets worse during September and October. In the comparatively wet grazing season of 1932, four yearlings in one lot of sixty died as a result of husk that developed into pneumonia.

There is no completely successful treatment against this complaint. If anything, the injection of chloroform into the wind pipe is the most satisfactory; this must be carried out by a veterinary surgeon. A successful injection kills the worms that lie in the wind pipe and cause the coughing. The treatment certainly does reduce the coughing, curing it in the case of some animals. To give an instance of the difficulty of curing husk, one yearling continued to cough a little after 2 chloroform injections and 8 doses of turpentine. The most popular treatment is dosing with a tablespoonful of turpentine mixed with the same quantity of linseed oil. Some graziers always reserve about a quarter of the dose for pouring down the nostrils, reasoning that this reaches the worms directly down the wind pipe. This is probably incorrect, and the benefit of the treatment lies in the turpentine entering the whole tissues of the animal through the stomach. Those who have had a sick animal slaughtered after it has been dosed with turpentine know that the whole of the meat is unsaleable because it smells of this substance. We can assume that husk worms would find the tissues of an animal dosed in the ordinary way to be disagreeable because of the flavour and smell of the turpentine. The drawback of both treatments is that they necessitate catching the animals individually. This is also probably the reason why so few cattle are treated against Warble Fly. Under modern conditions, when it is important to apply treatments against the various pests affecting the animals, it would pay graziers and breeders to erect an arrangement for the penning and individual catching of cattle; in many an instance when one is between two minds whether or not to dose, such an arrangement would cause the right decision to be made.

Husk is generally worst in wet grazing grounds, or in fields with a wet patch. This is probably explained by a fact mentioned in the Ministry's leaflet on the subject

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(Advisory Leaflet No. 15)—during the night the infective larvæ have the habit of climbing on to blades of grass in the dew or rain on their surface, the majority descending again when exposed to direct sunlight. This would explain the benefit of taking the cattle in at night. On a recently-visited, well-managed farm in the valley of the Tame near Tamworth, very little trouble is ever experienced from husk. The land is low-lying and sometimes flooded; the danger from flooding on similar land in the vicinity can be seen by the white posts, with notches a foot apart on each, that line a section of the road between Birmingham and Kingsbury. On the farm referred to, the young cattle are in an open shed at night; in addition, the land is not too heavily stocked with cattle—a point the importance of which is emphasized in the leaflet quoted above.

Threshing.—An early harvest is followed by an early start at threshing, and this year threshing was in full swing in the first week of September. There is generally less sweating in the stack after a hot, dry summer, except where the corn has not been allowed the usual time in the stook; under weather conditions like those of the past summer, much of the corn is carted after being only about half the usual time in the sheaf. Three weeks is regarded as the minimum period that should elapse between harvesting and threshing in order to get the best quality grain, and to get it clean off the straw.

In “the good old days,” before foreign barley and before the fusion of the breweries, there was a quick and sure market for malting barley, and there was a wave of threshing before the autumn rent became due. Prices were perhaps low, but there was consolation in a good supply of buyers; one was sure of meeting interested buyers at “The Bull” on market days, from October to Christmas, and later on towards spring. It is when prices are low, with buyers few and fugitive, and when the buyers have the moral support of a large stock of the foreign produce, that matters are really discouraging.

On many farms, particularly in the north and east, where the straw is fed to fattening cattle, threshing is carried out at short intervals, usually at early morning before the light appears, by means of small, stationary machines, the crop being put into small stacks suitable for the purpose. Where the operation is not carried out at such frequent intervals, a

hired travelling thresher is generally used. In districts of small farms, very little extra hired labour is used, the farmers helping their neighbours. In a district not far from here, there are rarely fewer than 18 men taking part in threshing; when one looks on and thinks of the two men on the combines abroad performing both harvesting and threshing, it "makes one think"! Still, one must not be too hasty in drawing conclusions; thrifty smallholders with little or no wage bill make formidable competitors. It is only necessary to recall that, in the Vale of Evesham, where vegetable production is carried out at such low costs, most of the land is actually dug by hand.

In the Rothamsted Report for 1934, faulty threshing is put down as one of the reasons why certain samples of barley were below the standard required by the brewer. With a hired machine it seems probable that, provided the screen is reasonably well adjusted, and that no grain is left adhering to the straw, one is too apt to assume that the adjustments are correct. As a result of the above reference in the Rothamsted Report, an inquiry was sent to Messrs. Marshall, Sons & Co., Ltd., of Gainsborough, on the subject of adjusting the machine for malting barley. The following are some important points in a reply kindly sent by the Manager of the company. "Generally speaking, the object to be attained when threshing should be that the awns are not entirely removed, but are broken off about $\frac{1}{8}$ in. from the end of the grain. This at times is very difficult, especially if much lean or semi-matured ears are present in the crop, but the concaves and awners are provided with some form of adjustment, and these should be set to meet the needs of each individual crop." "In a season like the present, it will be found in most cases that the awner is not needed, and the drum (if in good condition) will do all that is necessary; in a new machine it may even do too much" "It has frequently been noticed, on investigation of a complaint as to sample, that both farmer and thresherman pay no attention to adjustments, but simply push the sheaves through to get the stack finished. A few minutes spent in correctly setting the concave, and also awner if used, will amply repay the farmer, and give the thresherman a better name in the district."

It need only be added that when so much effort is being expended in getting grain of improved quality, it is worth

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our while not to relax just before the " finishing post " is reached.

Incidentally, the annual Rothamsted Report deserves a place on the bookshelf of the average farmer; the 1934 Report has been issued recently (2s. 6d. from the Secretary, Rothamsted Experimental Station, Harpenden, Herts.). The book contains reports of crop trials carried out at Rothamsted, Woburn and other centres; in addition, interesting reports of the two experimental farms are included, together with notes on insect and fungoid pests there. The scientific work of a fundamental nature carried out at Rothamsted is described in such a way that it will interest many farmers and will help old students to keep abreast of the times in soil and plant disease work. Rothamsted is an institution the work of which affects the " bread and butter " of most British farmers.

Rick Stones.—The anti-rat devices of two generations ago are not much used in our stackyards to-day, though many are still to be seen. In order to prevent rats from gaining entry, the stacks were built on cone-shaped pillars, 3 or 4 feet high, topped with disc-shaped pieces of stone or metal. The pillars were made of stone or metal. The disadvantage of such an arrangement is the extra work involved in unloading because of the increased height. Several causes contribute to the putting aside of this excellent anti-vermin arrangement—no bread is now made at home from the home-grown wheat, and there is also a smaller proportion of threshing left until the spring.

On a Warwickshire farm some fine rick stones made of red sandstone were being sold for decorating bungalow gardens; one was inclined to feel " another injustice to the old industry." Before leaving the farm, however, one had the satisfaction of seeing the material interchange between Agriculture and the Arts levelled up by an old violin that had been converted into a case for a set of weather instruments. This old violin, with a barometer set in the body, and a thermometer in the arm, seemed to symbolize a warning to those who might think that agriculture cannot fight back!

NOTES ON MANURING

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Artificial for Sugar-Beet.—At the recent Norwich meeting of the British Association, the Agriculture Section, as was natural in view of the local importance of the industry, devoted a good deal of attention to sugar-beet. Among several valuable papers was one by Dr. E. M. Crowther of Rothamsted, in which he discussed the manuring of the crop, reviewed a large number of field experiments with which he has been concerned, and contrasted the response of the beet and the potato plants to applications of fertilizers.

The paper, in fact, left one with a sense of disappointment, in that the experiments in question, when their results were analysed by modern scientific methods, showed that the beet crop had failed to respond, to the extent that might have been hoped, to moderately intensive treatment with artificial fertilizers.

It is, of course, well known that many factors other than manuring contribute greatly to the success or failure of the crop. Skilful preparation of the land, designed to produce a deep, fine and firm tilth, is one of these. A large plant population per acre, obtained by the use of narrow drills and small plant-to-plant intervals, is another. Early singling is also a very important point, and the correction of any degree of soil acidity, by means of an appropriate application of lime is, as is now well known, quite vital to success. Indeed the commonest of all causes of failure in the past has been neglect to supply the necessary amount of lime.

It might, however, have been expected that, where all ordinary skill and care had been given to these various points, the use of fairly liberal dressings of fertilizers would have produced profitable increases in yield. For one thing the ordinary crop of, say, ten tons of sugar-beet, contains substantially larger amounts of nutrients than does an average crop of potatoes. This amounts to saying that the beet plant ought to be "a greedy feeder." Yet Dr. Crowther's comparison between his two sets of experiments showed that the potato had given by much the larger and

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more regular responses to applications of all three of the nutrients commonly used.

In the one series of fertilizer trials a dressing of 2 cwt. per acre of sulphate of ammonia had significantly increased the yield of potatoes in 84 per cent. of the individual cases, and the average increase, over the whole series, worked out at 26 cwt. per acre. Thus, even with quite a low level of potato prices, such a dressing was highly profitable in the vast majority of trials. With sugar-beet, however, a significant response to the same dressing was obtained in only 52 per cent. of the trials, and the average increase was only 16 cwt. per acre; moreover, the increase in yield was associated with a fall in sugar-content, though this amounted to only a quarter of one per cent. Such a rate of increase is, in fact, quite profitable, though it can hardly be called spectacular.

With applications of phosphates and potash the contrast between the two crops was much more marked. Thus, an application at the rate of 4 cwt. per acre of superphosphate produced a significant increase in the yield of potatoes in 52 per cent. of the trials, and the overall average increase was 12 cwt. per acre; whereas with sugar-beet only 9 per cent. of the trials showed a significant increase, and the average was no more than 4 cwt. per acre. The effect on the sugar-content was negligible. It would doubtless be true that subsequent crops would benefit from the phosphate applied to the beet, but the fact remains that the beet itself failed, in the large majority of instances, to repay the farmer the money that he spent on superphosphate.

The story of potash was not very different. An application of 1 cwt. of pure potash (equivalent to about 2 cwt. of the sulphate or muriate) significantly increased the yield of potatoes in 47 per cent. of the trials, and gave an average increase of 16 cwt. per acre. With beet a significant increase was obtained in only 18 per cent. of cases, and the average increase, at 6 cwt. per acre, was (even allowing for a slightly improved sugar-content) little more than enough to pay for the manure. There were, however, it is important to note, a few instances in which potash gave a very striking and highly profitable response, which was not true for the phosphate dressing.

If we take the return to the farmer, for a hundredweight of sugar, at the outside figure of 12s., and take potatoes at the moderate valuation of 50s. per ton, the following table

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brings out the contrast between the two crops on the basis of money returned for money spent.

		<i>Crop Increases.</i>			
		<i>Cost of Application.</i>	<i>Potatoes. Cwt.</i>	<i>Potatoes. Value.</i>	<i>Sugar-Beet. Cwt. Value.</i>
2 cwt. Sulphate of Ammonia	14s.	26	65s.	2.0	24s.
4 cwt. Superphosphate ..	12s.	12	30s.	0.9	11s.
2 cwt. Muriate of Potash ..	15s.	16	40s.	1.5	18s.

It is not, of course, pretended that these figures represent the actual finance of the manuring of the two crops; but, taking them as they stand, they show that the potato crop returned, on the whole, 65s. for each 20s. spent on fertilizers, while the beet crop returned only 26s.

The reasons for the difference in the behaviour of these two important cash crops are obviously worth careful inquiry. Dr. Crowther himself pointed out that the majority of his beet experiments had been carried out under conditions more than ordinarily favourable for high yields, as was illustrated by the fact that the average yield of all the experimental plots, over the two seasons 1933 and '34, was about 12½ tons of roots per acre against an average for the country of about 9½ tons. It is possible, therefore, that under truly average conditions the responses to artificials would actually be greater than the experiments indicated.

Comparing the growth habits of the two plants, it is, of course, true that the potato has a very limited root range and hence must draw its nutrients from a small volume of soil; whereas the roots of the sugar-beet penetrate very deeply (they have been traced to depths of over four feet in the light soil at Woburn) and can presumably tap the deeper layers of the subsoil for the plant's supply of nutrients.

One might perhaps base either of two arguments upon the root habit of the beet. On the one hand, it may be that its roots, penetrating to layers of the soil that are not drawn upon by other crops, frequently find all that the plant requires. On the other hand it may be that the ordinary method of applying artificials, by broadcasting on the soil surface and harrowing in, is quite wrong for this crop. Phosphates and potash, particularly the former, are, when applied in this way, very tenaciously held in the upper two or three inches of the soil, until such time as the land is ploughed; and it may be that they do not reach the zone of

active root action and are thus not available to the beet plant. Arguing on these lines, there should be a definite advantage in ploughing in the phosphates and potash for this crop, as compared with a surface application.

In a recent bulletin,* Knowles and Watkin review the small amount of evidence that is available on this last point, and show that this evidence does support the view that there may be a substantial advantage in ploughing in the phosphates and potash. Thus, in one trial carried out by Lawson in West Sussex, two plots that received identical dressings, yielded 13.9 tons and 15.7 tons respectively, the only difference in treatment being that, in the second case, the artificials were ploughed under. Another pair of plots gave a difference of $2\frac{1}{2}$ tons, again in favour of ploughing in the fertilizers. In another experiment quoted a complete dressing of artificials, applied in the usual way at seed time, failed to increase the yield at all; whereas when the potash and phosphates were ploughed in early, and the nitrogen was harrowed in two weeks before seeding, an increase of 3 tons per acre was secured.

It is unnecessary, and very likely undesirable, that the nitrogen be deeply buried; and in theory there should be some advantage in keeping a little readily-available phosphate in the surface layers in order to speed up the growth of the seedling. Possibly, then, the best procedure would be to plough in the whole of the potash and the bulk of the phosphate, leaving the nitrogen and a little super to be harrowed into the surface. Experiments are now in progress designed to test this idea.

Lime for Sugar-Beet.—In another paper at the Norwich meeting, Mr. H. H. Stirrup, in the course of a review of sugar-beet diseases, sounded a minor note of warning against the use of excessive dressings of lime. The application of lime, as already mentioned, is often essential to the healthy growth of the plant, but it is not a case of the more the better.

One of the diseases of the beet (Heart Rot or Dry Rot) seems to be due, primarily, to a shortage of available boron in the soil, and if the soil be rendered alkaline, by over-application of lime, the boron is rendered unavailable to the plant. This position is thus closely parallel to that of "grey leaf" in oats, brought about by a shortage of available manganese and occurring only on alkaline soils.

* *The Zone of Soil to be fertilized for Sugar-Beet.* East Anglian Institute of Agriculture, Chelmsford, Bulletin No. 3.

PRICES OF ARTIFICIAL MANURES

Heart and Dry Rot of the beet can be prevented (and indeed cured in its early stages) by applications of borax, but it is better to avoid the risk by applying only the amount of lime that the soil actually requires to render it fit to grow healthy beet. It is now a simple matter for the soil chemist to ascertain the amount of lime required, and the farmer should make use of the services available rather than attempt the difficult feat of guessing the correct amount.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended September 11				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 16d	6 16d	6 16d	6 16d	6 7
Calcium cyanamide (N. 20.6%) ..	6 16s	6 16s	6 16s	6 16s	6 7
Kainite (Pot. 14%) ..	3 1	2 15	2 15	2 15	3 11
Potash salts (Pot. 30%) ..	4 13	4 12	4 10	4 8	2 11
" " (Pot. 20%) ..	3 18	3 12	3 10	3 12	3 11
Muriate of potash (Pot. 50%) ..	7 13	7 11	7 7	7 5	2 11
Sulphate, " " (Pot. 48%) ..	8 18	9 1	8 15	8 11	3 7
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 12a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16g	3 6
" " (S.P.A. 13½%) ..	2 15	2 11	2 15f	2 12g	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 10h	6 7	..
Steamed bone-flour (N. 1½%, P.A. 27½-29½%) ..	5 12	5 5	5 5h	5 5	..

Abbreviations; N. = Nitrogen; P.A. = Phosphoric Acid; S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

§ Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails 1s. 3d. extra.

h Prices shown are f.o.r. Appley Bridge.

NOTES ON FEEDING

W. B. MERCER, M.C., B.Sc., and W. A. C. CARR,
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How do they do it?—One can approach a beef feeder in either of two attitudes of mind. Knowing as one does that beef prices have for long fluctuated between 35s. and 40s. a cwt.—both perfectly “impossible” figures—one can view farmers practising this archaic trade as one views, for instance, the sorry peasants of a mountain glen struggling with antiquated tools to win a harvest from barren rocks, vaguely wondering how they manage to survive. Alternatively one can argue that since hardship and distress have ever proved the greatest spurs to man’s endeavour—was it not in the great ice age that *Pithecanthropus* upreared his ungainly self and became man?—it is to the distressed areas in farming one should look for new ideas and adjustments of traditional practice. In whichever direction one’s natural instincts lie, a spirit of inquiry is called for; for the fact that men do continue to carry on in beef-raising districts at the prevailing level of prices is matter worthy of investigation.

General Features.—One may note in the first place two attendant circumstances, the one God-given but transient, the other of man’s making but apparently a permanent feature of the situation. The summer of 1935 has on the whole provided favourable conditions for grazing animals. Sunshine and a dry bed count for nearly as much with feeding cattle as with spring lambs and those nesh creatures young turkeys. Good weather is a part substitute for food. One could, if necessary, prove this by reference to the starch equivalent required for maintenance under varying environmental conditions, the amount of vitamin D formed in sunlight, and so forth. Most people, we imagine, will be content to attribute it to mere animal comfort.

The second fact to note is that the present price—35s. per cwt.—is an *average* figure; like most averages it is considerably below the top figure. Nearly always there is a range of 5s. per cwt. between the quoted average for first quality beasts and the price obtainable for prime quality beasts in certain markets. Thus in June first quality beef was quoted in the Agricultural Marketing Returns at 37s. 6d.

NOTES ON FEEDING

per live cwt.; yet in the same month 75s. per cwt. dead weight (approximately 45s. per cwt live) was certainly obtained. This great range in price seems to be a regular feature of the beef trade; in hardly any other branch of farming is so large a premium on "quality" obtainable.

A Feeding System.—Quality premiums alone, however, could not hold the industry together. More important still are the steps taken to economize on feeding. A brief description of the means whereby this is achieved on certain farms in North-East Scotland may perhaps usefully be given.

The farms in question are wholly arable, and worked under a 6-course shift, including 3 years in grass. Aberdeen-Angus stores weighing 6 to 8 cwt. apiece are bought in bunches as opportunity offers between October and February. On arrival at the farm each bunch is graded according to age, the older animals being picked out for early finishing, i.e., during the winter. The younger cattle, which normally make up the great bulk, are run in yards on a daily ration of 50-60 lb. roots, 5-6 lb. of hay, straw ad lib., and 2-3 lb. of a corn mixture made up of about 3 parts oats, 2 parts barley, 1 part ground nut cake and $\frac{1}{2}$ part linseed (the exact mixture varying a little from time to time according to the supply of home-grown corn available). On this ration Aberdeen-Angus stores thrive. When turned out to grass late in April they would indeed pass, in many parts of the country, as prime fat.

They are, however, turned on to temporary grass for further feeding. No supplement of any kind is given. In June or July any animals that show signs of patchiness are disposed of if prices are attractive. The bulk are again graded in August and early in September. Those in most forward condition are tied up and fed on hay, roots, and 3-4 lb. corn per day. These are, of course, sold during the autumn. The less forward animals remain at grass until October, after which they are tied up or fed in yards for sale during the winter.

Slow v. Quick Feeding.—The most striking feature of the system is that at no period in the feeding process is the corn ration more than half that reckoned as normal in other areas. It seldom exceeds 4 lb. per head, while for quite half the period it is nothing at all. The rate of fattening is, of course, slow. On an average animals are on the farm for about 12 months, increasing from 7 cwt. to 12 cwt. live weight.

NOTES ON FEEDING

The rate of increase amounts, therefore, to little more than $1\frac{1}{2}$ lb. per head per day. Growth and fattening take place simultaneously, and the beasts are held for eight or ten months in a condition which, in some areas, would be considered fat. The system certainly results in very finely "marbled" carcasses. Economically, it seems at first glance unsound; it is certainly contrary to general farming and business practice, where quick turnover is ordinarily assumed to be a *sine qua non*.

Most economic principles, however, hold good only within certain price-strata. Sometimes they are actually false at other levels. The gross amount of food consumed in the growing-fattening process is undoubtedly much greater than when fattening is restricted to a three- or four-months' period; but of course most of the food consumed is very cheaply produced. This is especially true of the temporary grass, upon which the whole system really turns. The amount and quality of the fodder produced on these temporary leys needs to be seen to be believed. As we stated in a previous note in this JOURNAL they have to be allowed to develop some degree of roughness in order to reduce the luxuriance of the feed.

Our impression is that a rapidly fed young animal must be marketed as soon as it is ready, irrespective of the market. Slow feeding has the advantage—for what it is worth—of enabling the farmer to market more or less at will.

A Blunder Retrieved.—As an extreme instance of this, we may cite a recent experience that has come within our own knowledge. Some 30 bullocks were fed for the Christmas market in 1934, but held in expectation of a rise in prices. The expected did not happen; prices fell, and by the middle of January the owner was left with 30 animals, prime fat, on his hands. Their corn ration was reduced to 1 lb. per day and they were run on in yards until the grass came. After this, corn feeding was abandoned altogether. Barring a temporary set-back when they first went out to grass they retained their bloom throughout this novel sort of store period. They were eventually sold at the end of June, at 75s. per cwt. dead weight, realizing an average price of £29 per head (or £32 per head when the subsidy was added). It is beside our present point to discuss whether the venture was a wise one—so far as we can judge the original decision was wrong and the second decision

NOTES ON FEEDING

amounted to mopping up spilt milk; of more consequence is it to note that fat cattle can be treated in such an unusual manner. Apparently the carcass did not suffer.

Economic Complexities.—As a general principle, however, we are not disposed to lay stress on the control of marketing dates. Beef feeding, like most other forms of farming, is a continuous process, in which a certain amount of money is permanently locked up in the form of live stock. The individual animals composing the stock are of course constantly changing, but no sooner is one animal sold off than another is brought in to replace it. This makes a great difference to the effects of fluctuations in market prices. Many writers have shown that winter feeding is profitable only if the prices at the end of the period are higher than at the beginning. The evidence of cost accounts on the point is indisputable. Though interesting academically, the fact is not of much practical value—and this for two reasons. In the first place, be they dear or cheap at the outset, the stores represent the only practicable method of cashing the crops grown in the previous summer; in the second place, high sale prices for fat stock usually mean high purchase prices for the stores that replace them. From the “profits” on the outgoing lot a goodly sum must be deducted to make good the “losses” on the incoming lot. A feeder is at all times quite as much concerned about the prospective incomers as the outgoers.

The question of summer sales is equally complicated. It is well known that prices for fat stock tend to be high in June and July and low in October. June, however, is ordinarily a bad time to buy stores. Yet summer pastures cannot be left untenanted, else they will become overgrown and ruined. Further, a 9 cwt. bullock in June may easily scale 10½ cwt. in August; while the cost of keep may not be a measurable quantity. (We encountered the same problem recently when trying to convince an Irish grazier that he could afford to sell lying-off heifers in June at less than their prospective September value as down-calvers. Our fine-spun arguments about the second profit he could make on the next lot were met by a quiet “But you see I shan’t buy any more if I sell these.” No process of economic reasoning can meet that point.)

October, on the other hand, is usually a cheap time to replace cattle; and, statistics notwithstanding, prices for *high-class* fat stock are frequently quite good. Market returns at this period are a less reliable guide than usual,

NOTES ON FEEDING

owing to the immense numbers of relatively unfinished stock that drag down the average. It is then that the price disparity between high and low quality is most marked.

In practice, therefore, fluctuations in fat stock prices are buffered to a great extent by fluctuations in the prices of stores, and over a reasonably long period they seem to be of much less consequence than is generally supposed.

Is Life Worth Living ?—That depends, of course, on the liver. Most puns are merely fatuous. The author of this particular one spoke more truly than he knew. Probably he was thinking about his own liver and “that confounded cucumber I’ve eaten and can’t digest.” Anyway, he was not thinking about liver in general. He could not have foreseen what marvellous cures it would effect in cases of pernicious anæmia; still less did he know that vitamin D, the sunshine factor, would be found in the liver of a cod fish. Least of all could he have known about physin, because the term has only just been invented.

Pig-keeping produces almost as many tall tales as fishing. Everybody’s last litter weighed 48 lb. at weaning, as surely as the litters now running about will average 28 lb. Some of the tales are true—as, of course, some fishing tales are. The trouble is nobody knows why some litters reach phenomenal weights. George Dunlop has now supplied either an answer or a partial answer. The answer is physin.

When pigs on a given ration grow particularly fast, either of two things may be happening. It may be that the ration has a high net energy value or production-efficiency, so that a small quantity will produce a relatively big increase in live weight; on the other hand, it may be that the ration is so attractive to the animals that they eat a lot of it. In the first case the ration can scarcely fail to be profitable if the cost per cwt. is normal. In the second case it may or may not be—it is likely to be profitable during the early stages of growth, when the food increase ratio is naturally low, and much less so during the latter stages. Dunlop finds that a small quantity of raw liver added to a ration otherwise adequate as far as our present knowledge of essential dietary constituents goes, increases the growth rate of weanling pigs remarkably; this result being apparently caused by the physin in liver stimulating the pigs’ appetite. The constitution of physin is not yet known, but the substance is found also, though in much smaller quantities, in milk, whey, green food and fish meal.

FARM VALUES

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent Per cent.	Protein equivalent Per cent.	Per ton £ s.
Barley (imported)	71	6.2	5 1
Maize	78	7.6	4 2
Decorticated ground-nut cake	73	41.3	6 16
" cottonseed cake	68	34.7	6 15

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1.22 shillings, and per unit protein equivalent 1.57 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

FARM VALUES.

Crop	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9.6	5 3
Oats	60	7.6	4 5
Barley	71	6.2	4 16
Potatoes	18	0.8	1 3
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 9
Beans	66	19.7	5 11
Good meadow hay	37	4.6	2 12
Good oat straw	20	0.9	1 6
Good clover hay	38	7.0	2 17
Vetch and oat silage	13	1.6	0 18
Barley straw	23	0.7	1 9
Wheat straw	13	0.1	0 16
Bean straw	23	1.7	1 11

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu-rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro-tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	4 10	0 8	4 2	72	1 2	0.62	9.6
Barley, British feeding	5 10	0 7	5 3	71	1 5	0.76	6.2
Canadian, No. 3 Western..	5 7	0 7	5 0	71	1 5	0.76	6.2
" Argentine	5 7½	0 7	5 0	71	1 5	0.76	6.2
" Persian	4 17	0 7	4 10	71	1 3	0.67	6.2
" Russian	4 13*	0 7	4 6	71	1 3	0.67	6.2
Oats, English, white	6 0	0 8	5 12	60	1 10	0.98	7.6
" black and grey	6 0	0 8	5 12	60	1 10	0.98	7.6
" Scotch, white	8 0	0 8	7 12	60	2 6	1.34	7.6
" Canadian, No. 2 Western ..	8 0	0 8	7 12	60	2 6	1.34	7.6
" mixed feed	6 10	0 8	6 2	60	2 0	1.07	7.6
Maize, Argentine	4 2	0 6	3 16	78	1 0	0.54	7.6
" Russian Yellow	4 2†	0 6	3 16	78	1 0	0.54	7.6
" South African No. 2 White							
Flat	4 2†	0 6	3 16	78	1 0	0.54	7.6
" " " " 4 Yellow							
Flat	4 12†	0 6	4 6	78	1 1	0.58	7.6
Peas, Indian	8 15†	0 13	8 2	69	2 4	1.25	18.1
" Japanese	12 7†	0 13	11 14	69	3 5	1.83	18.1
Dari	6 10†	0 7	6 3	74	1 8	0.89	7.2
Mulling offals—Bran, British ..	5 7	0 14	4 13	43	2 2	1.16	9.9
" broad	5 17	0 14	5 3	43	2 5	1.29	10
Middlings, fine, imported ..	5 17	0 11	5 6	69	1 6	0.80	12.1
Weatings†	6 0	0 12	5 8	50	1 11	1.03	10.7
" Superfine†	6 12	0 11	6 1	69	1 9	0.94	12.1
Pollards, imported	5 2	0 12	4 10	50	1 10	0.98	11
Meal, barley	6 12	0 7	6 5	71	1 9	0.94	6.2
" grade II	5 17	0 7	5 10	71	1 7	0.85	6.2
" maize	4 15	0 6	4 9	78	1 2	0.62	7.6
" South African	4 12	0 6	4 6	78	1 1	0.58	7.6
" germ	5 0	0 10	4 10	84	1 1	0.58	10.3
" locust bean	7 10	0 5	7 5	71	2 1	1.12	3.6
" bean	8 5	0 15	7 10	66	2 3	1.21	19.7
" fish (white)	13 15	1 18	11 17	59	4 0	2.14	53
Maize, cooked, flaked	5 5	0 6	4 19	84	1 2	0.62	9.2
" gluten feed	5 10	0 11	4 19	76	1 4	0.71	19.2
Linseed cake, English, 12% oil ..	8 2	0 18	7 4	74	1 11	1.03	24.6
" " " 9% "	7 15	0 18	6 17	74	1 10	0.98	24.6
" " " 8% "	7 10	0 18	6 12	74	1 9	0.94	24.6
" " " 6% "	7 15½	0 18	6 17	74	1 10	0.98	24.6
Soya-bean cake, 5½% oil	7 10½	1 5	6 5	69	1 10	0.98	36.9
Cottonseed cake—English, Egyp- tian seed, 4½% oil	4 12	0 16	3 16	42	1 10	0.98	17.3
" " Egyptian, 4½% " ..	4 2	0 16	3 6	42	1 7	0.85	17.3
" " decorticated, 7% " ..	6 15†	1 5	5 10	68	1 7	0.85	34.7
" meal, decorticated, 7% " ..	6 10†	1 5	5 5	70	1 6	0.80	36.8
Coconut cake, 6% oil	6 5	0 16	5 9	77	1 5	0.76	16.4
Ground-nut cake, 6.7% oil	6 0*	0 17	5 3	57	1 10	0.98	27.3
" " " decor., 6.7% oil	7 2	1 5	5 17	73	1 7	0.85	41.3
" " " imported							
decorticated, 6.7% oil	6 10	1 5	5 5	73	1 5	0.76	41.3
Palm-kernel cake, 4½-5½% oil ..	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 4½% oil	5 17†	0 11	5 6	73	1 5	0.76	16.9
" " meal, 1-2% oil	5 12	0 11	5 1	71	1 5	0.76	16.5

Continued on next page

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Feeding treacle	5 0	0 7	4 13	51	1 10	0.98	2.7
Brewers' grains, dried ale ..	4 12	0 10	4 2	48	1 8	0.89	12.5
" " " porter ..	4 5	0 10	3 15	48	1 7	0.85	12.5
Dried sugar-beet pulp (a) ..	5 10*	0 5	5 5	66	1 7	0.85	5.2

(a) Carriage paid in 5 ton lots. * At Bristol. ‡ At Hull. † At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of August, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 18s. per ton as shown above, the cost of food value per ton is £9 2s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 6d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.34d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N. 6s. 6d. P₂O₅ 2s. 1d. K₂O 3s. 1d.

MISCELLANEOUS NOTES

National Rat Week, November 4-9, 1935

NATIONAL Rat Week has been fixed this year to commence on Monday, November 4, and the Ministry has again addressed to all local authorities exercising powers under the Rats and Mice (Destruction) Act, 1919, a circular letter inviting their co-operation and urging them to make a special effort during that week to secure concerted action for the destruction of rats and mice.

The Act requires every occupier of land or buildings to take the necessary steps to destroy rats or mice on his property or to prevent the property from becoming infested. Having regard to the immense amount of avoidable damage caused by these pests, not only in the destruction and contamination of foodstuffs and materials, but as agents and carriers of disease, it is of the utmost importance that local authorities responsible for the administration of the Act should take systematic action in the matter.

In its circular letter the Ministry has invited the attention of local authorities to the need for taking special action relative to any properties in their own occupation—e.g., rubbish tips, sewage farms, sewers, etc.—that may possibly be sources of infestation, and has suggested various means by which the attention of the general public may be drawn to their responsibilities.

In order to assist in the campaign the Ministry has arranged for local authorities to be supplied with copies of an illustrated "National Rat Week" poster, and of literature on the subject of rat destruction, and has also offered to lend copies of its cinematograph film, "The Rat Menace," illustrating the life history and habits of the rat and the means available for its destruction. A lecture illustrated by a set of 64 lantern slides on the same subject may also be borrowed.

The Ministry has issued a pamphlet containing a few simple suggestions for rat destruction together with a list of firms who supply preparations for destroying rats, and it has suggested to local authorities that copies of this pamphlet should be circulated to the general public in their areas. Useful suggestions and advice are also con-

MISCELLANEOUS NOTES

tained in the Ministry's Advisory Leaflet No. 49 on the "Destruction of Rats and Mice," single copies of which are obtainable free and post free from the Ministry.

Fuller information on the subject is contained in the Ministry's Bulletin No. 30, "Rats and How to Exterminate Them," obtainable through any bookseller, or direct from His Majesty's Stationery Office, price 6d. (7d. post free).

The Maynard Ganga Ram Prize

IN the issue of this JOURNAL for January last, it was announced that the Maynard Ganga Ram Prize was again offered for competition, *and readers are now reminded that the closing date is December 31 next, on or before which entries should reach the Director of Agriculture of the Punjab, Lahore, India.*

The Prize, of the value of 3,000 rupees, was founded through the generosity of the late Sir Ganga Ram, C.I.E., M.V.O., R.B., who presented the Punjab Government with a sum of 25,000 rupees for the endowment. It is awarded triennially for a discovery, or an invention, or a new practical method, that will increase agricultural production in the Punjab on a paying basis. The competition is open to the whole world, and Government servants are eligible to compete. Further details are given in an advertisement in this issue.

The Prize was last offered in 1933, but none of the entries then received was considered to be of sufficient merit to justify an award; and the Management Committee resolved, accordingly, to offer the Prize for competition after the lapse of a year.

Agricultural Machinery Testing Committee

THE undermentioned Certificate and Report issued by the Ministry, has been published in pamphlet form:—

No. 52. The Gascoigne Auto-Recorder Milking Plant.

The test was conducted at the National Institute for Research in Dairying, Shinfield, near Reading.

Copies of the pamphlet may be obtained price 4d., post free 5d. each, through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE August index of the prices of agricultural produce was 113 (corresponding month of 1911-13=100) or 1 point less than in July and 6 points less than a year ago. Seasonal falls occurred in prices of fat cattle, fat sheep, and potatoes, and lower prices were also recorded for wheat and oats. Values for barley, eggs, butter and wool, however, were higher.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13=100.)

Month.	1930	1931	1932	1933	1934	1935
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	114
August	135	121	105	105	119	113
September	142	120	104	107	119	—
October	129	113	100	107	115	—
November	129	112	101	109	114	—
December	126	117	103	110	113	—

Grain.—The average for wheat was 4s. 10d. per cwt. this August as against 5s. 1d. in August, 1934, and the indices were 60 and 64 respectively. Barley at an average of 7s. 10d. per cwt. showed a rise of 1s. 3d. on the month, but was 1s. 6d. cheaper than a year earlier, and the index at 103 was 20 points below the level of last August. Oats were cheaper on the month by 1s. 2d. per cwt. at an average of 6s. 5d., but this average was the same as a year ago and the index also was unaltered at 92.

Live Stock.—Fat cattle prices declined during the month, and the average of 31s. 2d. per live cwt. for second quality was 1s. 9d. below that of July and 4s. 9d. less than in August last year. The index showed a fall of 1 point on the month to 92, but if allowance were made for the payments under the Cattle Industry (Emergency Provisions) Act the index would be 107. There was a decline of $\frac{1}{4}$ d. per lb. in prices of second quality fat sheep and the index was 3 points lower at 114. Slight increases in price occurred in the case of fat pigs, baconers appreciating 1d. and porkers 3d. per score, but the index for the former fell 3 points to 98, while the latter remained unaltered at 97. Dairy cows and store pigs showed a rise in both price and index, but for store cattle and sheep there was a decline.

MISCELLANEOUS NOTES

Dairy and Poultry Produce.—No change took place in the regional contract prices of milk between July and August, and the index was unaltered on the month, but was a little higher than a year earlier. Farm butter was about 1½d. per lb. dearer than in July, with a rise of 5 points in the index to 92, or the same as a year ago, but the cheese index fell by 14 points on the month to 85. Eggs advanced about 4d. per dozen, and the index moved upwards from 114 to 133 as compared with a change from 97 to 119 in the corresponding period of 1934. Poultry was cheaper and the index declined by 5 points to 115.

Other Commodities.—Quotations for new crop potatoes were much lower in August than in the preceding month,

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity	1933	1934	1935			
	Aug.	Aug.	May	June	July	Aug
Wheat	72	64	67	69	68	60
Barley	125	123	91	94	88	103
Oats	79	92	97	98	99	92
Fat cattle	100	106	89	90	93	92
„ sheep	103	128	140	124	117	114
Bacon pigs	95	103	104	105	101	98
Pork „	96	108	106	103	97	97
Dairy cows	104	104	98	100	100	102
Store cattle	98	85	90	92	94	89
„ sheep	83	104	105	100	113	111
„ pigs	115	139	115	115	114	118
Eggs	117	119	99	107	114	133
Poultry	120	116	125	123	120	115
Milk	150	168	162	162	175	175
Butter	92	92	87	89	87	92
Cheese	115	96	94	98	99	85
Potatoes	91	153	113	137	166	137
Hay	71	101	100	100	99	101
Wool	72	87	83	85	86	89

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	119	108	109†	109†	107†	°
Fat Cattle	—	—	102	104	107	107
General Index	108	122	117	117	120	°

* Revised indices are not available, as estimated price and deficiency payment for wheat has not yet been assessed.

† Revised figures based on final payment for year 1934-35.

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and there was a fall in the index from 166 to 137. In 1934 the fall in price was less marked and the index rose from 136 to 153. Hay prices were very little changed, but as there was a seasonal decline in August, 1911-13, the index was 2 points higher at 101. Wool was rather dearer than in July, and the index appreciated from 86 to 89. As regards fruit, both apples and plums were very much dearer than in August, 1934, due to the short crops.

Agricultural Research Scholarships and Studentships

ON the recommendation of the Agricultural Research Council, post-graduate Scholarships and Studentships have been awarded by the Ministry as follows:—

Agricultural Research Scholarships:

THREE-YEAR SCHOLARSHIPS.

T. E. T. Bond (Botany).
C. G. Butler (Entomology).
S. Ellerton (Botany).

TWO-YEAR SCHOLARSHIPS.

R. C. Rainey (Entomology).
Miss E. H. Wetham (Economics).

Studentships for Research in Animal Health:

THREE-YEAR STUDENTSHIPS.

D. G. Davey.
Miss C. C. Sparke.

These awards are made with the object of training research workers, and thus to advance agricultural science and scientific studies bearing on animal health.

Scholarships for the Sons and Daughters of Agricultural Workmen and others

THE selection of candidates in connexion with this year's awards under the Ministry's scheme of scholarships for the sons and daughters of agricultural workmen and others has now been completed. The total number of applications received was 549, and 131 scholarships have been awarded. These awards were allocated as follows:—

Ten Senior Scholarships tenable at university departments of agriculture or agricultural colleges for degree or diploma courses in an agricultural subject; 6 Extended Junior Scholarships, not exceeding one year in duration for advanced or specialized courses of instruction at farm institutes or agricultural colleges; and 115 Junior Scholarships, tenable at farm institutes or similar institutions, for courses not exceeding one year in agriculture, horticulture, dairying

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or poultry husbandry, or in a combination of two of these subjects.

During the 14 years (1922-1935) the scheme has been in operation assistance has been granted to 1,540 individuals involving the award of 1,753 scholarships. The distribution of these awards among the various classes of beneficiary is as follows:—

	Thirteen years		Total.
	1922-1934.	1935.	
Sons or daughters of agricultural workmen	435	34	469
Sons or daughters of working farm bailiffs	126	12	138
Sons or daughters of smallholders	403	31	434
Sons or daughters of other rural workers	255	16	271
Candidates who qualified on their own account as <i>bona fide</i> workers in agriculture	403	38	441
	1,622	131	1,753

Rothamsted Winter Lectures

SIR JOHN RUSSELL, Director of the Rothamsted Experimental Station, has again arranged that Mr. H. V. Garner, Guide-Demonstrator of this institution, and other lecturers, shall be available during the winter to deliver lectures on the experimental work at the station to members of chambers of agriculture and horticulture, farmers' clubs, farm workers' associations, agricultural societies and kindred organizations. The lecturers' services will be provided without charge, but participating societies are expected to defray travelling and hotel expenses, and to make the necessary appointments with the lecture-staff. Requests for lectures should give as much notice as possible. A list of lectures and lecturers may be obtained on application to the Secretary, Rothamsted Experimental Station, Harpenden, Hertfordshire.

Stud Goat Scheme, 1935-36

THIS Scheme, having for its object the improvement of the productive quality of milch goats kept by small-holders, cottagers and others of similar position, is again in operation. For the current breeding season, which lasts till February 29 next, 92 stud goats have been registered and are standing at various centres throughout the country, including 12 in Wales, and their services are available for goats belonging to persons in the above-mentioned

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categories at a nominal fee, in no case exceeding 4s. Conditions of service and other information may be obtained from the County Agricultural Organizers at their respective County Education Offices, or from the Secretary of the British Goat Society, Roydon Road, Diss, Norfolk, which body is responsible for the administration of the Scheme.

Grand International Poultry Show, Crystal Palace

THE Grand International Poultry Show will be held at the Crystal Palace, London, from November 19 to 21 next. This year, special attention is being devoted to the utility section, which for the first time will comprise classes for officially pedigreed cockerels and for live table poultry. Several advantages over laying trials are claimed for this section. The birds will be staged in such a manner as to permit of comparison as well as of inspection. The exhibits will include male birds that have no place in the trials, and visitors will be able to ascertain from the awards the type of bird that is regarded as satisfactory by the judges.

Information concerning fees, conditions of entry, etc., may be obtained on application to The Show Manager, Mr. S. A. Legg, Crystal Palace, London, S.E.19.

Agricultural Wages (Regulation) Act, 1924; Report of Proceedings

THE Ministry has recently issued a Report of Proceedings under the Agricultural Wages (Regulation) Act, 1924, for the year ended September 30, 1934. The Report reviews the work of the Agricultural Wages Board and of the Agricultural Wages Committees during the period, and contains full details of the minimum rates of wages for agricultural workers, as fixed by the Committees. In addition, the Report deals with the results of the investigations made by the Ministry's Inspectors for the purpose of securing the proper observance of the minimum rates, and with the state of employment in agriculture and the demand for labour. The Report is obtainable through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 1s. 0d. net, post free 1s. 2d.

Foot-and-Mouth Disease.—Four outbreaks of Foot-and-Mouth Disease were confirmed on September 24 and 25—two in Glamorgan, one in Monmouthshire and one in Warwickshire. Orders of the Ministry have been made declaring Infected Areas of 15 miles' radius round the Infected Places.

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Enforcement of Minimum Rates of Wages.—During the month ending September 14, 1935, legal proceedings were taken against six employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area.	Court.	Fines imposed.	Costs allowed.	Arrears of wages ordered.	No. of workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Cornwall	Camborne	8 0 0	—	35 13 7	2
Kent	Canterbury	1 0 0	—	14 18 0	1
Lincs. (Kesteven and Lindsey)	Epworth ...	1 10 0	—	8 3 4	2
Caernarvon ...	Pwllheli ...	10 0	7 0	1 4 0	2*
Radnor	Presteign ...	15 0	5 0	14 4 0	1
... ..	"	2 17 6	2 6	26 14 0	1
		£ 14 12 6	14 6	100 16 11	9

*Case of one worker dismissed.

Farm Workers' Minimum Rate of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1, on September 16, Sir William Dampier, F.R.S., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages, and proceeded to make the following Orders:—

Gloucestershire.—An Order fixing minimum and overtime rates of wages to come into force on October 6, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until October 4, 1936. The minimum rates for male workers of 21 years of age and over are for head carters 35s. 6d. (instead of 34s. 6d.) per week of 58 hours in summer, except in the week in which Good Friday falls, when the hours are 51, and 37s. (instead of 36s.) per week of 60 hours in winter, except in the week in which Christmas Day falls, when the hours are 52½; for head shepherds and head stockmen 37s. (instead of 36s.) per week of 60 hours, except in the weeks in which Christmas Day and Good Friday fall, when the hours are 52½; for under carters 33s. 6d. (instead of 32s. 6d.) per week of 54 hours in summer, except in the week in which Good Friday falls, when the hours are 48, and 35s. 6d. (instead of 34s. 6d.) per week of 57 hours in winter, except in the week in which Christmas Day falls, when hours are 50½; for under shepherds and under stockmen 35s. 6d. (instead of 34s. 6d.) per week of 57 hours, except in the weeks in which Christmas Day and Good Friday fall, when the hours are 50½, and for other male workers 31s. (instead of 30s.) per week of 50 hours in summer, except in the week in which Good Friday falls, when the hours are 41, and 48 hours in winter, except in the week in which Christmas Day falls, when the hours are 39½. The overtime rates for all male workers of 21 years of age and over are 9d. per hour on weekdays and 11d. per hour on Sundays, Christmas Day and Good Friday. For female workers of 18 years of age and over the minimum rate is unchanged at 5d. per hour.

Shropshire.—An Order varying the existing minimum and overtime rates of wages, the rates as varied to come into operation on September 29, 1935. The minimum rate for male workers of 21 years of age and over is 32s. (instead of 31s. as at present) per

MISCELLANEOUS NOTES

week of 54 hours, with overtime unchanged at 9d. per hour on weekdays and for attention to stock on Sundays, and 10d. per hour for other employment on Sundays. The minimum rate for female workers of 18 years of age and over remains unchanged at 5d. per hour, with overtime at 6d. per hour.

Pembroke and Cardigan.—An Order fixing minimum and overtime rates of wages to come into force on October 1, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until September 30, 1936. The minimum rate for male workers of 21 years of age and over is 31s. (instead of 30s. 6d. as at present) per week of 52 hours in winter and 54 hours in summer, with overtime unchanged at 8d. per hour. For female workers of 18 years of age and over the minimum rate remains unchanged at 5d. per hour for 8 hours per day throughout the year, with overtime on weekdays at 6d. per hour and on Sundays at 6½d. per hour for the first three hours and 7½d. per hour for subsequent hours.

WIRELESS TALKS TO FARMERS IN OCTOBER

<i>Date</i>	<i>Station</i>	<i>Time</i>	<i>Speaker</i>	<i>Subject</i>
2, 9, 16, 23, 30 2	National	7.5 p.m.	Professor J. A. Scott Watson and others	For Farmers Only
	Midland	9.40 p.m.	Mr. Oliver Baldwin	Our Country Correspondent on Oxfordshire
4	Midland and North	6.30 p.m.	Messrs. W. B. Thompson and Wilfred Arden	Sugar-Beet — Autumn Cultivation
7	Midland	8.0 p.m.	Mr. S. L. Bensusan and others	Back to the Land. A new series of talks on land settlement schemes in the Midlands
17	Midland	6.30 p.m.	Messrs. W. B. Thompson, R. W. N. Dawe and R. W. Ward	Young Farmers' Clubs
		7.55 p.m.	Mr. Moore Darling, Agricultural Correspondent of <i>The Birmingham Post</i>	Our Country Correspondent on Shropshire
17	North	6.30 p.m.	Prof. J. A. Hanley & Mr. J. F. Faulder	For Northern Farmers in particular Discussion on present-day Cropping in the North-West of England
4	N. Ireland	7.15 p.m.	Mr. Peter Fitzpatrick	Farmers' Work and Worry
11, 25	N. Ireland	8.0 p.m.	Not yet settled	For Ulster Farmers
3	West	6.30 p.m.	Mr. A. W. Ling	For Western Farmers in particular
8	West	—	Mr. A. W. Ling and others	The Market Special: 'This Milk Business'

APPOINTMENTS

<i>Date</i>	<i>Station</i>	<i>Time</i>	<i>Speaker</i>	<i>Subject</i>
9	West	7.35 p.m.	Sir Francis Acland	The Changing Village—1. The Changing Scene
14	West	8.30 p.m.	Mr. F. W. Harvey	Gunter's Farm No. 1: The story of a farming family
16	West	7.50 p.m.	Not yet settled	The Changing Village—2
17	West	6.30 p.m.	Messrs. Eldred and A. W. Ling	For Western Farmers in particular: 'Why I cannot make farming pay'
23	West	7.35 p.m.	Messrs. F. G. Thomas and C. G. Hayter Hames	The Changing Village—3
24	West	10.35 p.m.	—	A walk round the Imperial Fruit Show and Canners' Exhibition at Greyfriars Hall, Cardiff
4	Scottish	6.50 p.m.	Mr. A. D. Buchanan Smith	For Scottish Farmers in particular
10	Scottish	6.30 p.m.	Mr. F. A. Bell	Milk Marketing
17	Scottish & N. Ireland	9.15 p.m.	Messrs. Peter Fitzpatrick and A. D. Buchanan Smith	Discussion on farming
24	Scottish	6.30 p.m.	Mr. J. R. McCallum	Field Drainage

APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS

ENGLAND

Bedfordshire.—Mr. W. J. Moyse, N.D.A., has been appointed Assistant Agricultural and Horticultural Organizer.

Cornwall.—Mr. E. Beckley has been appointed Assistant Lecturer in Horticulture, *vice* Mr. W. J. Moyse, N.D.A.

Northamptonshire.—Mr. F. I. Williams has been appointed Temporary Assistant Instructor in Dairying.

WALES

Denbighshire.—Miss K. Lloyd, N.D.D., has been appointed Assistant Instructor in Dairying, *vice* Miss E. M. Lloyd, N.D.D.

Monmouthshire.—Mr. R. F. Hall, N.D.P., has been appointed Assistant Instructor in Poultry-keeping, *vice* Mr. C. H. King. Mrs. H. Chisholm, N.D.D., has been appointed Instructor in Rural Domestic Economy, *vice* Miss J. E. Oliver, Dip. Dom. Science, resigned.

AGRICULTURAL RETURNS

STAFFS OF AGRICULTURAL COLLEGES

Harper Adams Agricultural College, Newport, Shropshire

The following appointments were made during the past Session, the vacancies, in all instances, arising through resignations on taking up new appointments:—

Mr. J. Thacker, N.D.A., C.D.A., N.D.D., to be instructor in Dairying, vice Mr. J. I. Littlewood, N.D.A., N.D.D.

Mr. W. Lee, A.I.C., to be Analyst, *vice* Mr. G. H. Botham, B.Sc., F.I.C.

Mr. W. G. D. Walters, M.Sc., to be Soil Survey Assistant, *vice* Mr. G. Owen, M.Sc.

Mr. H. C. F. Newton, B.Sc., to be Advisory Entomologist, *vice* Mr. E. E. Edwards, M.Sc.

Mr. A. Thomson, M.R.C.V.S., to be Assistant Veterinary Officer, *vice* Mr. C. Crompton, M.R.C.V.S., D.V.S.M.

Mr. J. B. Paterson, N.D.A., C.D.A.D., to be Lecturer in Engineering, etc., *vice* Mr. D. N. McHardy, N.D.A.

Mr. Keith Wilson, N.D.P., to be Senior Assistant Lecturer in Poultry Husbandry, *vice* Mr. I. W. Rhys, N.D.P.

In consequence of a reorganization of staff, no new appointment has been necessary to the post of Assistant Lecturer in Poultry Husbandry, vacated on marriage by Miss H. M. Molyneux, N.D.P.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1935

ACREAGE OF HOPS.—PRELIMINARY STATEMENT COMPILED FROM THE RETURNS COLLECTED ON JUNE 4, 1935, SHOWING THE ACREAGE UNDER HOPS IN EACH COUNTY OF ENGLAND IN WHICH HOPS WERE GROWN, WITH A COMPARATIVE STATEMENT FOR THE YEARS 1934 AND 1933.

Counties, etc.		1935	1934	1933
		<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Kent	East ...	2,000	2,097	2,001
	Mid ...	2,950	2,862	2,629
	Weald ...	5,080	5,050	4,736
	Total, Kent	10,030	10,009	9,366
Hampshire		540	585	536
Hereford		3,950	4,016	3,805
Surrey		110	93	89
Sussex		1,440	1,420	1,200
Worcester		1,850	1,851	1,838
Other Counties		80	65	61
Total		18,000	18,037 ^a	16,895 ^a

* These figures include the acreage left unpicked which was estimated in 1934 to be about 270 acres and in 1933 about 20 acres.

NOTICES OF BOOKS

The Poultry-Keeper's Text-book. By E. T. Brown, F.L.S. 2nd Ed. Pp. 320, with 150 Figs. (London: Ward, Lock & Co., Ltd. 1934. Price 6s.)

A comprehensive survey of the theory and practice of poultry-keeping covers a much wider field than the author of this work could be expected, in the restricted space at his disposal, to deal with fully and adequately. He has, however, made a very creditable attempt to cover a large part of the ground, and his manual, although a little unbalanced in parts, explains clearly and concisely many of the modern methods adopted in the commercial breeding and rearing of poultry for both meat and egg production. The book is practical in character, profusely illustrated, and should prove a useful guide to both the poultry farmer and the student of poultry husbandry.

L'Elevage du Porc en plein Air. (*Open-Air Pig-keeping.*) By G. Legendre. Pp. 125 and 43 figs. (Paris: Librairie Agricole et Horticole de la Maison Rustique. 1935. Price 6 fr.)

This little book is interesting because it shows that in spite of the very different conditions that prevail in some of the European countries, the breeding of pigs in the open air in France follows very much the same lines as in this country. It is also gratifying to find that most of the breeds of pigs favoured in France have received the imprint of our Large Whites.

M. Legendre has provided, in a small space, a complete textbook of his subject, written in simple language, suitable for the actual small-scale pig farmer. The points he emphasizes are those which are familiar to all experienced pig breeders, and he sets out the aims of the French pig breeder, which resemble very closely those of our English farmers.

The composition of the herbage on which the pigs feed, is, of course, one of the most important factors in running open-air pigs, and M. Legendre discusses the relative value of the various grasses in some detail. He has, however, a preference for lucerne which is, perhaps, hardly shared to-day in this country, because pigs cannot assimilate so large a proportion of fibre as the ruminants. The author admits that in spite of the many advantages of keeping pigs in the open air, it is not a system that can invariably be adopted, although the method has marked advantages. It is cheap, and allows a pig-breeding undertaking to be set up at the lowest cost. Farmers who are contemplating pig-keeping are always well advised to consider the different methods in relation to the local conditions.

The Frequency of Days with Specified Duration of Sunshine. Professional Notes, No. lxix. By E. G. Bilham, B.Sc., D.I.C., and L. F. Lewis, B.Sc. Pp. 10. (London: His Majesty's Stationery Office. 1935. Price 3d.)

This pamphlet discusses the incidence of sunshine in regard to the percentage frequency of days with (a) no sunshine, (b) more than 3 hours, (c) more than 6 hours, (d) more than 9 hours, and (e) more than half the possible duration. Data in the first four categories are given for eighteen stations in Great Britain, and in the final category for six selected stations. Results show that at most stations about half the days throughout the year have more than 3 hours of sunshine, and that in May, June and July about half the days have more than 6 hours.

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*The Manurial Value of Sewage Sludge

THE following note has been received from Mr. E. Hannaford Richards, B.Sc., F.I.C., of Rothamsted Experimental Station, Harpenden:—

In 1905-07 the Royal Commission on Sewage Disposal,* by arrangement with the Board of Agriculture, made a series of field trials with typical sewage sludges. The first experiments were carried out on mangolds and turnips, at Rothamsted, Cambridge, Leeds, Wye and Glasgow. Further trials, on hay, were made at these centres and also at Aberdeen, Bangor and Newcastle-on-Tyne. The same sludges were tested at Woburn on grass land and by pot-culture experiments with wheat.

The sludges were produced by precipitation (3), septic tank (1), settlement without precipitant (1), and two specially prepared sewage fertilizers were included. The results of these trials showed that none of the sludges had any appreciable value as manure. According to Dr. J. A. Voelcker, none of them was worth 10s. a ton on the farm. It should be noted, however, that the quantities of sludge used were small, varying from one to two tons per acre.

Thirty years after these experiments were made, the methods of sewage disposal are practically unchanged as far as concerns the production of sludge. Indeed, the only important difference in sewage works practice tends further to reduce the small amount of available nitrogen in the sludge. Owing to the difficulty of disposing of sludge, many works now digest it in anaerobic tanks and utilize the gas yield for power production. The bulk of sludge is thus

* Appendix VIII, 5th Report, 1908 (C.I. 1286).

NOTES FOR THE MONTH

reduced, but only the most resistant constituents remain in solid form.

It is particularly unfortunate that although the most recent process of sewage purification, viz., by bio-aeration, should produce a sludge of really high manurial value, this activated sludge has so far been found so difficult to dry that it cannot be easily used as a fertilizer. Consequently this sludge is now mostly subjected to gas-digestion treatment, which brings its value down to the level of the older types of sludge.

Although, generally speaking, there does not appear to be any significant change in the past thirty years in the value of sewage sludge as manure, there are certain towns where the sludge is prepared specially for use as fertilizer and finds a ready market. Usually the particular nature of the sewage or local trade waste is a factor in these instances.

As only 9 out of 85 local authorities circularized by the Ministry of Agriculture in 1934 supplied any analyses of their sewage sludges, and only one of these (Leeds) was included in the trials of 1905, it is not possible to make any direct comparison of the changes, if any, in the past thirty years. The average content of nitrogen, 2.23 per cent., and of phosphoric acid, 1.40 per cent., in the dried sludges of 1934 is a little higher than in the sludges tested by the Royal Commission in 1905, but in the one instance where direct comparison is possible there has been no significant change in the composition of the sludge.

It is probably true that to-day even a smaller proportion of the fertilizing value in the foodstuffs consumed by the population reaches the soil than in 1905, when the old sewage farm was being replaced by the new biological filter plants. The available nitrogen in the crude sewage is partly lost as gas, and the remainder, together with much of the available phosphorus, is continually being washed away, as more or less purified effluent, to the sea.

Power Farming Conference at Oxford

A POWER Farming Conference will be held at Oxford in January next under the joint auspices of the School of Rural Economy, the Institute for Research in Agricultural Engineering and the Agricultural Economics Research Institute. The date provisionally fixed for the Conference is January 7 to 10, and a detailed programme will be issued during the present month.

NOTES FOR THE MONTH

Daffodil Rash

A RASH known as "lily or daffodil rash" is fairly common among bunchers in the cut flower trade, while a form of eczema or dermatitis on the hands may be experienced by workers handling large quantities of dry bulbs. Contact with *Primula obconica*, chrysanthemums and poison ivy is also known to produce a variable degree of irritation of the skin in certain persons.

Dermatitis among those handling flowers and bulbs has been studied by Dr. Sibyl G. Horner, M.B. Lond., D.P.H., H.M. Medical Inspector of Factories. She has found that it is comparable with the dermatitis occurring among industrial workers in contact with substances such as alkalies, oils, terpenes, flour, sugar, and teak woods—all of which substances are known to possess in varying degree the power of irritating the skin. Among those who gather and bunch daffodils and tulips, the rash may first appear on the hands or arms as an irritating "spot," which later becomes a blister. When these spots are numerous or become scratched, a rash may develop. Pollen may be the cause of a severer form of dermatitis than that which results from contact with the sap of daffodils and tulips. Sore finger tips and painful splitting of the skin around the finger nails has been observed in those who handle bulbs, particularly tulip bulbs. Fortunately not all are equally susceptible. Some workers never suffer any ill effect from handling cut flowers or bulbs, whilst in others these painful rashes appear with the advent of each flower harvest.

Measures of Prevention.—It is probably not practicable, or even desirable to protect the hands with rubber gloves while working. It is, however, quite practicable to protect the tender skin of the wrists and forearms (where a rash often starts) by wearing over the arms and down to the wrists old woollen or cotton stockings with the feet cut off.

The hands can best be protected by the use of an ointment or a "cream." A mixture of lanoline (1 part) and vaseline (3 parts) rubbed on the hands is useful, but it is rather greasy. A non-greasy preparation,* or a "vanishing cream," can be substituted. A protective film forming an "invisible glove" over the exposed skin, if properly applied, prevents

* The composition of such a "cream" described in the *Bulletin of Hygiene*, Nov., 1934, p. 735, is as follows:—Ivory soap flakes, 7·48 per cent., glycerine, chemically pure, 26·4 per cent., sodium silicate, 24·2 per cent., tragacanth, 0·21 per cent., oil of lemons, 0·6 per cent., water, 41·6 per cent.

NOTES FOR THE MONTH

the irritant from coming into contact with the skin. Before beginning work the hands should be clean, then the preparation, preferably the non-greasy one, as it stays on better, is applied and well rubbed in to get a continuous film over the skin of the hands, wrists and arms (if these are not covered). Immediately the work is finished the hands should be thoroughly washed, when the dirt stains and protective film are easily removed by soap and water.

There are also other points to be observed. The pollen and sap of the flowers are capable of causing dermatitis through entering cuts or sores, and it is very important not to rub the eyes with the fingers whilst handling flowers, especially if the flowers are matured and shedding their pollen. Exceptionally sensitive workers have found it desirable to wear goggles while handling flowers that are shedding their pollen.

Cuts and sores, including those resulting from chafing with raffia or rubber rings, are the commonest sites for the beginning of dermatitis. It is, therefore, essential that if such injuries occur they should be completely covered,* so that contact with plant juices or pollen while at work is avoided.

Employers will find it advantageous to keep a close watch on the condition of workers' hands, so that any signs of injuries or dermatitis can be detected and steps taken to prevent further development of the trouble.

If these precautions are taken dermatitis should become a rarity amongst flower workers.

The Ministry would be interested to be informed of cases of dermatitis that occur among those handling flowers or bulbs.

Treatment.—If in spite of all precautions a rash appears, it should be realized that a cure cannot be expected while contact with sap or pollen continues. There is, moreover, the danger of a severe dermatitis which is difficult to cure, if work is continued in such circumstances.

When a rash is present workers are often tempted to apply substances of an actually irritant nature, such as preparations containing carbolic or iodine, since these will temporarily allay the irritation. Such treatment has been condemned by the medical specialists.

The affected parts should not be washed in soap and

* Bandages or dressings should be covered with waterproof plaster.

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water, while carbolic or lysol lotions will make the conditions worse. Oil or a soothing ointment, such as one composed of lanoline and castor oil, may be applied.

It should be remembered that an early case properly treated is likely to be completely cured, whilst a mistreated or neglected one may easily become chronic and intractable.

Taint in Milk

THE following note has been received from Messrs. H. T. Cranfield and J. Mackintosh:—

Occasionally a taint in milk has been found which has been attributed to the feeding of molassed beet pulp; and we contributed to the September, 1935, issue of this JOURNAL a report on experiments which had been carried out to ascertain the conditions under which a taint might be produced in milk during the feeding of molassed beet pulp. This taint was described as "fishy" because the odour and flavour in the tainted milk closely resembled that of fish. Subject to the observance of simple safeguards, clearly described in the report, and to the pulp being normal, the risk of taint would seem to be small.

A correspondent has, however, drawn our attention to the use of the term "fishy" and stated that some farmers have inquired whether the manuring of the sugar-beet crop with fish manure might be a contributory cause of the taint. It can be said with confidence that the use of fish manures, or any other kind of manures, in the growing of the sugar-beet crop, has no connexion whatsoever with the taint referred to.

The tainting substance—trimethylamine—is a derivative of betaine, a substance which occurs in many foodstuffs of vegetable origin. The expression "fishy" has been used because it is the commonly expressed description of the odour and flavour of trimethylamine.

The 11th International Horticultural Congress

THE first International Horticultural Congress was organized in 1889, and others have since been held in various large cities such as Chicago, Brussels, Amsterdam, Vienna, London, Paris, etc., it now being usual to arrange to hold them triennially. The 11th International Congress was held at Rome from September 16-21 this year, and was followed by a tour of the principal horticultural areas of Italy. Thirty-four countries sent official delegations, that

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from the United Kingdom being led by Mr. H. V. Taylor, the Ministry's Commissioner of Horticulture, as Chief Delegate, and comprising, in addition, Dr. A. B. Rendle, Mr. F. J. Chittenden and Mr. C. W. Leak (representing the Royal Horticultural Society), with Mr. D. Akenhead (representing the Imperial Bureau of Fruit Production, East Malling Research Station).

The total attendance exceeded 300. Papers on many aspects of horticulture were presented, discussions followed, and, when any action was desired resolutions were adopted.

Two of the important decisions related to nomenclature and the securing of patents for new varieties. All the countries represented pledged themselves to adopt the names for plants at present used by the Royal Horticultural Society of England. The Congress was very anxious to secure international legislation protecting the sale of novelties, by patents, and passed a resolution urging that Governments should consider the possibility of giving effect to the suggestion.

The tours to the horticultural areas made it clear that great progress in production has been made in Italy, both in increasing the area and in improving the standard of crops.

The British delegation had a very warm welcome in Rome and much enjoyed the visit.

Work of the Land Division of the Ministry, 1934

THE provision of small holdings and allotments, by local authorities, under the Small Holdings and Allotments Acts, is one of the chief topics dealt with in the recently published Report of the Work of the Land Division of the Ministry for the year 1934.* According to the Report, the position of the small holder is somewhat better than in 1931. Arrears of rent are being overcome and applications for reductions are less frequent. Rent abatements are still being given, but in some cases on a reduced scale. The exceptions are the pure market garden holdings and poultry holdings. Owing to the competition of the larger farms in the supply of the cheaper vegetables, such as cabbages, peas, beans and brussels sprouts, the small market gardener who has not turned to other crops has, in many instances, experienced diminishing prices. Prices of poultry and eggs have also

* Obtainable through any bookseller, or direct from H.M. Stationery Office at the addresses given on the cover of this JOURNAL, price 1s., post free 1s. 1d.

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been greatly reduced, with the result that, in Lancashire, where this type of holding is prevalent, some holders are devoting part of their land to cultivation under glass, growing, especially, tomatoes and chrysanthemums, and are doing well; while some market gardening is being practised on poultry holdings in the south-western counties. Some of the Hampshire strawberry growers are also successfully experimenting with glass. Dairy holdings on the whole are doing fairly well as, owing to the Milk Marketing Scheme, there is a certain market for the milk, though returns are less. Arable holdings are doing better, as wheat and sugar-beet have been good and profitable crops. Generally, the regulations of the Potato Marketing Board seem to have been beneficial. The beef subsidy has helped and sheep prices have been good, but, on the whole, stock-raisers are worse off than in 1931. Pig-keeping is increasing, probably owing to the more stable prices realizable.

The report deals also with the activities of the Ministry in relation to many other matters of rural importance, such as the administration and finance of the Ministry's farm settlements; the sanction of schemes submitted by land-owners in regard to loans under the Improvement of Land Acts; the extinguishment of fines and other manorial incidents attaching to land formerly of copyhold tenure; the control and management of commons; sales and other transactions under the Universities and College Estates Act and the Glebe Lands Act; the appointment of arbitrators in connexion with matters of dispute between landlord and tenant affecting agricultural holdings; and the redemption and apportionment of, and other transactions relating to, tithe rentcharge.

An interesting section of the report deals with the activities of the Ministry in connexion with the destruction of musk rats or musquash, of which the importation into and keeping within Great Britain have been prohibited by an Order made under the provisions of the Destructive Imported Animals Act, 1932. Musk rats have been at liberty in considerable numbers in two areas, in Salop and parts of adjoining counties, and in West Sussex, Surrey and Hampshire. Reference is made in the report to the fact that the very marked reduction in the number of animals captured gives ground for the hope that the musk rat position is now definitely under control, and that complete extermination of the pest may eventually be possible.

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Vegetable Diseases

IN 1933, at the suggestion of a prominent vegetable grower, the Ministry published a brief summary of the essential information then available on fungus and allied diseases of vegetables. This summary, issued as Bulletin No. 68, and based on information gathered over many years by the Ministry's Plant Pathological Laboratory, proved to be a very popular publication. A second edition, incorporating the results of later work, was prepared and has now been issued.*

This Bulletin is not a scientific handbook on the subject, but rather an inventory or annotated list of the chief diseases that attack the crops of market gardeners and vegetable growers. The standardized common names of the diseases are given, with the scientific name of the causal agent (where one is concerned), together with such details of the symptoms as will enable the cultivator to recognize the complaint. Where control measures are known, these are briefly indicated.

References are given to a large number (187 in the present edition compared with 156 in the 1933 issue) of published scientific papers containing the results of research carried out in this country on many of the diseases. This list is not only of use to growers who may wish to interest themselves in the details of investigations concerning some particular disease, but by its completeness it should be of assistance to research workers as indicating what work has been done on the problems of vegetable diseases, and what gaps in our knowledge of them remain to be filled.

* Bulletin No. 68, *Vegetable Diseases*, obtainable through a bookseller or from His Majesty's Stationery Office. Price 9d. (by post 10d.).

A COST INDEX FOR MISCELLANEOUS FARM EXPENSES

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THERE is little difficulty in tracing fluctuations in the cost of the major farm requirements, for a record of the cost of such items as labour, foodstuffs, manures, etc., is regularly published by the Ministry of Agriculture. On the other hand, statistics in regard to changes in the cost of the numerous small but nevertheless necessary charges, usually grouped under the heading "miscellaneous expenses," are scarce—which, perhaps, is not surprising when it is realized what a variety of items is included under this head. The magnitude of the farmer's outlay under this general heading is not widely appreciated outside the industry. Financial records collected in various parts of the country suggest that these miscellaneous costs amount to as much as 35-40 per cent. of the farmer's labour bill, or 10-15 per cent. of his total expenses. On this basis total expenditure in England and Wales on these sundry items (which do not appear in the official estimates of farmers' requirements) must amount to a figure in the neighbourhood of £20-30 millions annually, a total large enough to merit some attention.

During the winter of 1934 inquiries were made with the object of comparing the present day prices of a large number of these items with the prices of 1913. The Guilds of local craftsmen and the Agricultural Engineering Association have been particularly helpful, not only in suggesting sources of information, but in collecting a great deal of material; the assistance given by the rating and insurance offices, and numerous firms and contractors, has also been most useful. Indeed, the enthusiasm of these informants was most gratifying, and some gave, in addition to details of prices, interesting material far removed from the aim of this article. For example, who would imagine Scotland heading the list for the most elaborate harness, with Manchester a possible second? The variation in price for the majority of items has been taken from more than one source, and the inquiries have been sufficiently extensive to justify us in taking the index per unit, given in column (2)

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of the following table, as reasonably representative of the country as a whole.

A financial survey of farming in the Eastern Counties during the years 1931-1933 showed that the annual expenditure on miscellaneous items averaged, in the aggregate, approximately £1 per acre per annum in this arable area, and represented some 15 per cent. of the gross farm costs. It would entail extensive tabulation to give the actual composition of these items, but a broad analysis is set out in column (1) of the table. The purpose of this note is to compare the unit cost of each item in 1934 with the corresponding figure in 1913, and to calculate an index for the total.

COMPOSITION AND COST INDICES OF MISCELLANEOUS EXPENSES

Item	Percentage of total miscell expenses (1931-33)	1934 Cost Index (1913=100)	
		Per Unit	Per Farm
	(1)	(2)	(3)
	%	Index	Index
Implement Repairs & Replacements	16·8	160	160
Threshing	9·5	157	126
Coal	5·7	200	182
Rail Carriage	5·7	155	155
Shoeing and Harness Repairs ...	5·4	188	146
Local Rates	5·4	—	74
Building and Fencing Repairs ...	4·8	143	131
Contract Cultivations	3·8	140	143
Fire Insurance	3·0	100	127
Veterinary and Medicines... ..	2·8	150	112
Binder Twine	2·6	93	50
Sundries	5·0	150	150
Comparable Miscellaneous Expenses	70·5	—	110
Internal Combustion Engines :			
Insurance and Repairs ...	8·9	—	—
Fuel and Lubricant ..	13·0	—	—
Road Transport	7·6	—	—
Total	100·0	—	156

For each item of the Miscellaneous Expenses given in the table there are three columns. The first shows the relative importance of each as an item of cost in the Eastern Counties during the years 1931-33, and it is probable that such figures may also be taken to represent 1934. The other two columns show variations in the costs, these being expressed as an index on the 1913 base; column (2) gives the cost index per unit, and column (3) the cost index per farm. It

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must be borne in mind that in order to combine these indices the base of each must be converted to coincide with the 1934 composition. Such calculations show that for each £100 spent on these items in the Eastern Counties to-day, some £64 probably sufficed in 1913, thus giving an over-all index of 156 above the pre-war base.

Although internal combustion engines (particularly fixed engines) figured in the equipment of a few farms in 1913, they were then only of small importance in the expenses of the agricultural community as a whole. Further, it is possible that a great deal of what at the present day is included under "road transport" would then have been done by the farmer's own wagons. It may reasonably be assumed, therefore, that the last three items appearing in the table would not have occurred as such in the pre-war farmer's expenses. The difference between 1934 and 1913 in the cost of "Implement repairs and replacements" is very difficult to assess, and unless estimates were actually given by the firms concerned, it has been taken as similar to that of new implements. Even with new material, however, it is not always a simple matter to make a comparison, since the nature of the purchases has itself been altered. Although many implements made to-day are practically identical in design with those of 1913, the materials used in their construction have altered in some instances, due both to the extra strength required for tractor haulage, and to the fact that in many instances higher-priced material has had to be used. These remarks refer more particularly to some types of machinery than to others (e.g., the price of self-binders has been placed at 123 per cent. above 1913), but in view of modern improvements these are perhaps not strictly comparable. Grass mowers show an increase in price of 62 per cent., chaff cutters 55 per cent., mills 45 per cent., and root cutters 80 per cent. over the pre-war figure, and it is probable that these have not been greatly changed either in design or material. At the same time single-furrow horse ploughs have advanced in price by some 75 per cent., and double-furrow ploughs by 100 per cent., while potato lifters and horse rakes have shown an increase ranging from 40-60 per cent. Such changes illustrate that, even if machines were identical at both periods, it would be difficult to combine such divergent figures, and so obtain a general index for this item. This fact was stressed by a noted firm of agricultural engineers when they suggested a 60 per cent.

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increase in price for farm machinery in general. Other information appears to confirm this estimate, which has been taken as representing the increase in the present day price of new implements and repairs over that of 1913.

Difficulties occasioned by variation in quality will probably not affect other items to such an extent as those considered above. The cost of hiring threshing tackle has increased from 9*d.* (in 1913) to 1*s.* 2*d.* per sack when the work is performed by the "piece." Where the tackle is hired "by the day" the relative figures are 30*s.* in 1913 as compared with 47*s.* 8*d.* in 1934. Steam cultivating and ploughing charges have increased only about 40 per cent. in the last twenty years, as these machines have had to face fierce competition from tractors. Steam coal and shoeing now cost twice as much as in 1913, while the price of harness has increased by about 65 per cent.; binder twine, on the other hand, is now cheaper than formerly. The cost of bricks and draining tiles shows an increase of 100 per cent., whilst timber prices are probably no more than 20 per cent. above the pre-war figure; these two have been combined to give an increase of 43 per cent. for these materials. The rates for fire insurance risks have been stated by three of the largest insurance companies as being now at their pre-war level. With rail transport the increase is difficult to assess as there are now special rates for particular streams of traffic, and some allowance has been made on this account, but the rise of 55 per cent. may err on the high side. The rise in veterinary charges and sundries has been estimated.

The difference in the cost per unit of all these items is given in column (2) of the table above, the figures being expressed as an index over that of 1913. Such figures do not, however, necessarily indicate the variation in the cost per farm. For instance, the corn growing area is less to-day than in 1913, therefore the total amounts of threshing done and of binder twine used have diminished; similarly a decline in the number of horses now kept has resulted in a decrease in the blacksmiths' and saddlers' accounts.

Although fire insurance rates are the same as in 1913, any alteration in the value of farm produce, or in the popularity of insurance, will affect the farmer's total payments under this heading, but whether there is more or less insurance to-day than formerly it is impossible to say. For such reasons adjustments (see column (3)) have been made in

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the unit cost of six items in the table, in order to arrive at the change in cost "per farm" in the Eastern Counties. With regard to local rates, the difference in the cost per farm has been estimated, and recalling the fact that land was derated in 1929, the cost of this item to-day is considerably below that of 1913. A suitable method of adjustment for the remaining costs is difficult to find, it being impossible to ascertain to what extent the general contraction of business in times of depression affects such items as the up-keep of buildings, machinery, etc. In such circumstances it must be assumed that the indices of unit costs are also representative of variation in the cost per farm.

The combination of all these items shows that whereas to-day total miscellaneous expenses amount to about 21s. per acre in the Eastern Counties, the comparable figure in 1913 was about 14s. Such figures, however, may be misleading, for the 21s. includes expenses attached to internal combustion engines, and the counterpart of these items was represented by men and horses in 1913. It is, of course, impossible to say how far man and horse power have been replaced by these mechanical devices; it is, however, certain that but for their aid the present day labour bill would be higher than it is. If the last three items in the table are ignored, and the comparison confined to the remaining 70 per cent. of the total, it would appear that these comparable miscellaneous expenses per farm are now only 10 per cent. higher than in 1913. This figure would have been at least 35 per cent. had it not been for the De-rating Act.

The difficulties of obtaining reliable cost indices per unit for many of the items will be realized, but it is felt that the figures in the table are approximately correct. The "per farm" index, however, is more open to question and must, therefore, be used with caution. In particular, it must be borne in mind that while column (2) of the table may be assumed to represent conditions in England and Wales as a whole, column (1) and column (3) refer only to the arable conditions of the Eastern Counties.

LIVE STOCK IMPROVEMENT SCHEME: REPORT FOR THE YEAR 1934-35—I

THE Live Stock Improvement Scheme has, during the year under review, maintained its position as a factor in the improvement of the live stock of the country. The depressed state of trade for beef cattle has led many farmers who were interested in the breeding of stock to turn to milk production, and not infrequently to lose interest in stock rearing. This tendency, as might be expected, has not had a favourable effect on the premium bull scheme, but on the other hand the need for the production of a good type of bacon pig to meet present day marketing requirements has led to a greater demand for the use of premium boars. Owing to the continued improvement in the trade for heavy horses, greater use has also been made of stallions that have received grants under the scheme.

Perhaps the most important matter in connexion with live stock improvement during the year was the coming into force in England and Wales of the Improvement of Live Stock (Licensing of Bulls) Act, 1931, on August 1, 1934. Every bull, calved on or after October 1, 1933, must now be licensed by the time it reaches the age of 10 months. Bulls that are rejected as unsuitable for licence must be slaughtered or castrated, unless a permit is granted to keep the bull for fattening purposes for a prescribed limited period. The owner of a rejected bull may appeal if he so desires, in which case the bull is inspected by a referee selected from a panel that has been set up for the purpose. The decision of a referee is final. Speaking generally, it may be said that the Act has been favourably received by the farming community. Not unnaturally, the introduction of a new measure of such wide application has met here and there with a certain amount of criticism, but this has been mainly from the class of farmer who regards a bull solely as a means of getting his cows in milk, and who before the introduction of the Act was the friend of the scrub bull. As might have been anticipated, there is evidence of a certain amount of non-compliance in the early stages, but with the passage of time and the better knowledge of the require-

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ments of the Act, this feature will doubtless disappear. Fuller reference to the working of the Act is made later in this report.

Premium Bulls.—As already indicated, the principal factors that have affected the bull scheme during the year have been the poor prices realized for fat cattle and the consequent turnover to milk production on the part of many farmers. The introduction of the Cattle Industry (Emergency Provisions) Act, 1934, under which payments are made to farmers when their fat cattle are marketed, has undoubtedly been of assistance to the industry, but it has not been able to make beef production a really profitable business, and many farmers who previously bred and reared cattle, and who were interested in securing a good bull as the sire of the stock that they reared, have been induced by the stabilization of the price of milk and the guarantee of a market to change over to milk production.

As a result of this change to milk production, less attention is given to the breeding and improvement of the cattle, and consequently in some parts of the country interest in the premium bull scheme has not been maintained. In addition, the size of herds appears to be increasing, and more farmers tend to keep bulls of their own. Such bulls are in most cases inferior to the average premium bull. Fewer calves are being reared. There is also an increasing tendency to use Guernsey, British Friesian or other purely dairy bulls with cows of other breeds, with the object of producing either milk of a richer quality and colouring, which seems so much in demand, or heifers that will give a higher milk yield. One result of this cross-breeding with dairy bulls is that good quality feeding steers are now difficult to obtain in some districts that were once noted for them.

Another difficulty with which the premium bull scheme has to contend is the great increase of road traffic, which makes farmers hesitate to allow their cows to be driven some distance along congested roads to the bull. An interesting commentary on the latter point is provided by the fact that if a triangle is drawn with London as the apex and the coast from Bognor to Eastbourne as the base, it will not include the location of a single premium bull.

Taking all the circumstances into consideration, it is a matter for congratulation that the number of bulls available

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for service under the scheme during the year increased by 7 to 1,476. The number of societies operating under the scheme, 1,371, was the same as in the previous year.

TABLE I.

Number of Bulls Subsidized each Year since the Commencement of the Scheme.

<i>Year</i> <i>(April 1-March 31).</i>	<i>No. of</i> <i>Bulls.</i>	<i>Year</i> <i>(April 1-March 31).</i>	<i>No. of</i> <i>Bulls.</i>
1914-15 ..	497	1925-26 ..	1,175
1915-16 ..	633	1926-27 ..	1,287
1916-17 ..	659	1927-28 ..	1,372
1917-18 ..	710	1928-29 ..	1,408
1918-19 ..	721	1929-30 ..	1,476
1919-20 ..	675	1930-31 ..	1,537
1920-21 ..	668	1931-32 ..	1,494
1921-22 ..	847	1932-33 ..	1,452
1922-23 ..	947	1933-34 ..	1,469
1923-24 ..	978	1934-35 ..	1,476
1924-25 ..	1,069		

The total number of cows served during the year was about 94,700, belonging to 22,700 owners, an average of slightly over 4 cows per owner. The average number of persons sending cows to each bull was 14 in England and 19 in Wales, whilst the average number of services per bull was 66. These figures plainly show that the opportunity of securing the use of a good bull is appreciated by the small farmer, for whose benefit the scheme was largely instituted.

Premium bulls and their progeny were very successful at agricultural and fat-stock shows and sales during the year. Championships were won at the Royal Cornwall Show by a subsidized South Devon and a Shorthorn; and at the Devon County Show by a Devon bull and a Guernsey, the former having since been sold for export for 150 guineas. A premium Welsh Black won a championship at the Royal Welsh Show, and a South Devon took a first prize at the Royal Show.

A bull sired by a premium bull obtained first prize in its class at the Hereford February Sale, and was sold to His Majesty the King for 300 guineas. The Devon champion at the Smithfield Show was sired by a premium bull, which also sired several bulls that were in the prize list and made high prices at the Devon Sales at Exeter. The bull which won the Southern, Midland and Welsh Shorthorn Breeders' Association's Challenge Cup at the Show and Sale at Birmingham in January, 1935, and was sold for 110 guineas,

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was sired by a premium bull located in Wales. This list is by no means complete, as a number of first and other prizes were won at various county and local shows, but it bears testimony to the high standard of sires provided under the scheme. The classes for premium sires and their progeny at shows continue to attract considerable interest.

The operations of the Welsh Dragon Mark Store Cattle Association during the year have been very successful, and many new buyers from a distance have attended the store cattle sales.

The Bletchley and District Livestock Improvement Society's scheme for the earmarking of calves by premium bulls has made further progress during the year, and the number of calves marked shows an increase of 103 over the figure for last year. Owing to the unremunerative prices of store cattle the farmers operating the Staffordshire and Warwickshire Societies calf-marking schemes have lost interest in cattle rearing and sold the calves as soon as possible after birth. Interest in rearing, however, has revived during the past few months, and it is hoped that farmers will make more use of the scheme in the future.

Breeds and Prices.—Table II gives the number and average prices of each breed located in the last three years, and this shows that the average price paid for subsidized bulls has again decreased a little. On the whole, however,

TABLE II.
Number and Average Prices of Premium Bulls.

BREED	1932-33				1933-34				1934-35			
	No.	Average price			No.	Average price			No.	Average price		
		£	s.	d.		£	s.	d.		£	s.	d.
Aberdeen Angus	7	45	9	3	6	39	12	0	7	36	9	10
British Friesian	2	65	12	6	3	50	1	8	5	40	3	2
Devon ...	190	48	18	5	194	47	6	7	200	46	17	4
Galloway ...	2	36	2	6	3	27	6	0	3	27	6	0
Guernsey ...	23	41	19	7	28	37	8	5	31	39	4	7
Hereford ...	207	41	10	8	214	40	4	5	213	39	7	3
Lincoln Red												
Shorthorn...	153	43	5	4	152	39	1	2	157	39	1	5
Red Poll ...	2	38	7	6	2	38	7	0	1	36	15	0
Shorthorn ...	775	43	3	7	773	41	18	0	759	41	4	9
South Devon ...	11	51	6	7	13	43	15	0	15	42	15	3
Sussex ...	8	36	15	3	8	34	14	5	9	34	8	5
Welsh Black ...	72	30	5	4	73	27	18	6	76	27	19	4
All Breeds ...	1,452	43	2	0	1,469	41	5	1	1,476	40	14	5

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the standard of quality of the bulls under the scheme has been maintained, although the small farmer with limited resources who often owns the premium bull, has at times found it difficult to provide the necessary money for the purchase of bulls of the required standard.

Shorthorns, although 14 less than last year, still account for more than half the bulls located under the scheme, 504 being dairy, 171 beef and 84 dual-purpose. Ninety of the beef Shorthorns are in Wales. Herefords with 213 (113 in Wales) are the next most numerous breed, and Devons with 200 (all in Devon, Cornwall and Somerset) are a good third.

Service Fees.—The service fees charged for the use of premium bulls during the past three years have been as follows:—

<i>Service Fees—Bulls.</i>									
<i>• Year</i>	2/6	3/-	3/6	3/9	4/-	4/6	5/-	5/6	6/-
1932-33	77	55	59	—	129	16	848	10	113
1933-34	79	52	56	1	147	14	865	9	109
1934-35	95	48	61	1	173	20	833	9	108
<i>Year</i>	6/6	7/-	7/6	8/-	8/6	9/-	9/6	10/-	10/6
1932-33	13	3	114	6	1	—	—	7	1
1933-34	14	3	106	5	—	—	—	9	—
1934-35	11	5	103	4	—	—	—	5	—

The number of service fees above 5s. has declined from 255 to 245, while those under 5s. increased from 349 to 398. The gradual tendency towards lower service fees continues.

Premium Boars.—The number of subsidized boars at the end of March, 1935, was 1,032, or 25 more than in 1933-34.

TABLE III.
Number of Boars Subsidized each Year since the Commencement of the Scheme.

<i>Year</i>	<i>No. of</i>	<i>Year</i>	<i>No. of</i>
<i>(April 1-March 31).</i>	<i>Boars.</i>	<i>(April 1-March 31).</i>	<i>Boars.</i>
1914-15	115	1925-26	710
1915-16	193	1926-27	844
1916-17	216	1927-28	907
1917-18	264	1928-29	933
1918-19	350	1929-30	972
1919-20	399	1930-31	1,047
1920-21	441	1931-32	1,024
1921-22	550	1932-33	973
1922-23	569	1933-34	1,007
1923-24	638	1934-35	1,032
1924-25	655		

The average number of services per boar in the year under review was 66, an increase of 9 over the previous year, and the total number of sows served was 64,541, belonging to 25,176 persons. The number of sows served

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increased by 10,284 over the number in the previous year, and the number of senders by 2,247.

The effect of the Pigs Marketing Scheme is particularly noticeable in regard to the breeding of the commercial bacon pig. It has done more than anything else to demonstrate to the farmer the class and type of pig required, with the result that greater care is used in the selection of a suitable sire. Breeders are finding that it is better to take their sows some distance to a good boar rather than use inferior boars of their own. There has consequently been greater appreciation of the good work done by premium boars, and the demand for grants has shown a steady increase. It is interesting to note that more small holders are taking up pig breeding and rearing, and have derived much benefit from the use of premium boars.

Reports from various districts indicate the value of the premium boar scheme. A better type of pig is being bred by the use of premium sires, and satisfactory prices are being obtained for the progeny, which also grade well at the bacon factory. One large dealer in an eastern county, who buys over 1,000 pigs a week, has expressed his opinion that the scheme has done a very great deal to improve the type of pig bred in the past few years in his area.

During the year the progeny of premium sires have again attracted favourable notice in the show ring. The Bledisloe Cup at the London Dairy Show was won by the progeny of a subsidized Large White boar, and the progeny of a Yorkshire premium boar gained several prizes at the Yorkshire Pedigree Breeders' Association Show and Sale at York, including 1st, 2nd and 3rd prizes for gilts, 2nd and reserve prizes for 1934 boars, the latter making the highest price for a boar at the sale. Prizes were also won at the Smithfield Show and at various county shows.

Breeds and Prices.—The average price of boars provided under the scheme in 1934-35 was £10 19s. 3d., an increase of 10s. 5d. over the average price for 1933-34. Large Whites averaged £10 19s. 0d. an increase of 10s. 1d. over the previous year.

The popularity of the Large White shows no signs of abating, the number under the scheme having increased by 54 during the year. In 1924-25, 247 (or 40 per cent.) of the 617 boars in use under the scheme were Large Whites; in 1934-35, 969 (or nearly 94 per cent.) of the 1,032 were of this breed. No "coloured" pig is now in use under the

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scheme in Wales, there being 188 Large Whites, 12 Lop-eared and 23 Welsh boars located.

TABLE IV.
Number and Average Prices of Boars of Each Breed.

BREED	1932-33			1933-34			1934-35					
	No.	Average price			No.	Average price			No.	Average price		
		£	s.	d.		£	s.	d.		£	s.	d.
Berkshire ...	10	10	6	1	6	9	1	6	2	13	13	0
Cumberland ...	24	10	8	8	11	9	4	5	2	8	14	0
Essex ...	2	9	4	0	2	9	9	0	1	10	10	0
Gloucester Old Spots	2	15	5	0	1	10	10	0	—	—	—	—
Large Black ...	23	10	9	2	8	12	1	3	5	11	9	2
Large White ...	816	10	14	0	915	10	8	11	969	10	19	0
Large White Ulster	1	12	0	0	—	—	—	—	—	—	—	—
Lincoln Curly Coated	8	7	14	3	5	6	10	10	—	—	—	—
Long White Lop-eared	30	11	16	7	16	11	18	6	16	11	13	11
Middle White ...	37	11	5	3	21	9	9	1	11	9	4	6
Wessex Saddle-back	7	10	11	5	2	8	18	6	2	11	11	0
Welsh ...	13	10	17	0	20	11	16	8	24	11	13	5
All Breeds	973	10	14	5	1,007	10	8	10	1,032	10	19	3

Service Fees.—There is little change to record in the service fees charged for premium boars; 5s. continues to be the fee usually charged, and is now applicable to 74 per cent. of the boars. Fees of over 5s. are charged in about 12 per cent., and under 5s. in the remaining 14 per cent., of the cases. The following table shows fees charged during the last three years:—

Service Fees—Boars.

Year.	2/6	3/-	3/6	4/-	4/6	5/-	5/6
1932-33 ..	3	10	21	85	5	720	2
1933-34 ..	4	11	18	92	6	743	2
1934-35 ..	2	11	21	99	7	763	2
Year.	6/-	6/6	7/-	7/6	8/-	10/-	
1932-33 ..	62	3	2	56	—	4	
1933-34 ..	70	3	2	53	—	3	
1934-35 ..	71	2	1	50	1	2	

Premium Rams.—The number of grants awarded for Welsh Mountain rams during the 1934 season remained unchanged at 30, the hiring fees ranging from £6 to £12, with service fees from 1s. to 3s. 4d. Twenty of the rams were hired at £10 or over. This scheme, which in its early days

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was operated as an experimental measure in North Wales only, has now been extended throughout the Principality and is designed to encourage the breeding of an improved type of sheep suitable for rearing on the Welsh hills. The rams, which must be entered or accepted for entry in the Flock Book of the Welsh Mountain Sheep Society, as well as the ewes mated to them, are selected by a Committee and approved by the Live Stock Officer so as to ensure their suitability as conforming to the Welsh Mountain breed or type. During the 1934 season 1,774 ewes were sent for service under the scheme, representing an average of 59 ewes per ram. The influence of the scheme is already very marked, and perhaps it may be said that no section of the Live Stock Improvement Scheme has produced such pronounced results within a comparatively short time.

Horse Breeding—Heavy Horse Grants.—Satisfactorily high prices have been obtained during the year for all classes of horses suitable for agricultural work, and the demand for geldings suitable for town work has been good. The stimulus to horse breeding which was referred to in the Report for 1933-34, has consequently continued. This is shown by the increase in the number of stallions licensed under the Horse Breeding Act, 1918, indicated later in this

TABLE V.—HEAVY HORSE SCHEME.

<i>Service Season</i>	<i>No. of Stallions</i>	<i>Total No. of Mares served</i>	<i>Average No. of Mares served</i>	<i>No. of Assisted Nominations</i>	<i>Average Hiring Fee of Stallions</i>	<i>Average Service Fee</i>
					£	£ s. d.
1914 ..	72	6,365	68	1,503	231	2 8 6
1915 ..	97	9,122	94	2,430	241	2 9 6
1916 ..	108	9,995	92	2,181	244	2 11 0
1917 ..	110	10,556	96	2,151	258	2 16 3
1918 ..	122	12,281	100	2,165	285	2 15 8
1919 ..	118	10,920	96	1,996	317	3 6 3
1920 ..	105	9,133	87	1,839	345	3 13 1
1921 ..	101	7,888	78	1,943	333	3 13 7
1924 ..	87	6,098	70	*	178	2 7 0
1925 ..	96	7,413	77	1,723	194	2 8 4
1926 ..	98	8,165	83	2,171	208	2 8 6
1927 ..	105	8,950	85	2,599	211	2 8 9
1928 ..	114	9,792	86	2,805	217	2 9 4
1929 ..	120	10,196	85	3,052	221	2 9 9
1930 ..	140	12,248	87	3,604	239	2 11 1
1931 ..	159	14,226	89	4,266	235	2 10 2
1932 ..	162	14,624	90	3,945	226	2 9 9
1933 ..	165	15,655	95	4,280	220	2 10 8
1934 ..	170	16,071	95	4,353	221	2 10 6

* No grant was made by the Ministry for assisted nominations (except to the Cumberland and Westmorland Society) for the service season 1924.

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Report, and is also reflected in the increased activities of the Heavy Horse Societies that receive grants under the Live Stock Improvement Scheme (see Table V).

The progeny of subsidized sires continue to do well at local and county shows. The champion foal and the champion filly at the Three Counties Show were by a subsidized stallion from Wales, while the group prize at the Shire Horse Show, 1935, for the best stock sired by one stallion was won by a sire travelled by a Midland Society operating under the Ministry's Scheme. This is the third successive year that this prize has been won by the progeny of a subsidized stallion. A two-year-old gelding sired by a stallion hired by a subsidized society in Yorkshire was second in its class at the same show.

The figures in Table V do not include those relating to the Cumberland and Westmorland Heavy Horse Society, which issues assisted nominations to selected stallions travelled by their owners in these counties. The figures for this Society are as follows:—

<i>Service Season.</i>	<i>No. of Assisted Nominations.</i>	<i>Service Season.</i>	<i>No. of Assisted Nominations.</i>
1915	.. 385	1926	.. 220
1916	.. 394	1927	.. 247
1917	.. 328	1928	.. 281
1918	.. 321	1929	.. 283
1919	.. 264	1930	.. 269
1920	.. 254	1931	.. 290
1921	.. 255	1932	.. 198
1924	.. 121	1933	.. 217
1925	.. 197	1934	.. 209

Grants were paid for 170 stallions in 1934 against 165 in 1933, while the average number of mares served per stallion was the same as in the previous year. The total number of mares served, including those in Cumberland and Westmorland, was 16,280, an increase of 408.

The number of assisted nominations issued was 4,562, the highest number issued under the scheme since its inception. Assisted nominations can be issued only to *bona fide* farmers whose holdings do not exceed 100 acres, or, if exceeding 100 acres, are of an annual value for income-tax purposes of not more than £100. As the regulations permit of the award of only one assisted nomination to a mare owner it will be seen that the increased interest in horse breeding is not confined to the large farmer.

The average hiring fee of the stallions was slightly higher than in the previous year, whilst the average service fee

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showed no appreciable change. There were 132 Shire, 22 Clydesdale and 16 Suffolk stallions travelled under the scheme in 1934 as compared with 128 Shire, 22 Clydesdale and 15 Suffolk stallions in 1933.

The results of the services by subsidized stallions in 1933 show that 58·3 per cent. produced foals, which compares with 58·5 per cent. in the previous year and 59 per cent. in 1931. The number of foals sired by subsidized stallions was 8,769, about 29 per cent. of the total number of heavy foals returned as on agricultural holdings on June 4, 1934, whilst grants were paid in respect of only 11·8 per cent. of the heavy stallions licensed in the country in 1934.

Licensing of Stallions.—The number of stallions licensed under the Horse Breeding Act, 1918, in England and Wales was 1,687, an increase of 171, or 11 per cent., on the previous year. Licences were refused in respect of 45 stallions, an increase of 5 as compared with 1933. Of the rejected stallions, 36 were of heavy breeds and 9 of light breeds.

TABLE VI.—LICENSING OF STALLIONS.

<i>Year (ending October 31).</i>	<i>No. of Applications for Licences.</i>	<i>No. of Licences issued.</i>	<i>No. of Refusals.</i>
1920	4,153	3,749	404
1921	4,060	3,816	244
1922	3,644	3,479	165
1923	2,897	2,761	136
1924	2,285	2,210	75
1925	1,908	1,849	59
1926	1,664	1,608	56
1927	1,574	1,537	37
1928	1,454	1,414	40
1929	1,472	1,436	36
1930	1,472	1,430	42
1931	1,470	1,432	38
1932	1,522	1,477	45
1933	1,556	1,516	40
1934	1,732	1,687	45

As will be seen from Table VII heavy stallions accounted for 1,433 of the licences issued during the 1934 season, an increase of 158 on the previous year. There is evidence that clean-legged horses continue to gain in popularity, and this is borne out by the fact that whereas the number of licensed Shires rose from 888 to 962, or 8 per cent., Suffolks increased from 154 to 182, or 18 per cent., Clydesdales increased from 138 to 163, or 18 per cent., Light stallions generally only showed an advance of one, but Thorough-

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breeds rose from 134 to 143. Pony stallions increased from 61 to 73.

TABLE VII.
*Numbers of Licences Granted under the Horse Breeding Act, 1918,
in England and Wales, 1933 and 1934.*

BREED or TYPE	Pedigree (i.e. Stallions entered or accepted for entry in the recognized Stud Book of their Breed)		Non-Pedigree (i.e. Stallions not entered or accepted for entry in a recognized Stud Book)		Totals of each Breed and Type (Pedigree and Non-Pedigree)	
	1933	1934	1933	1934	1933	1934
Heavy :						
Shire ...	789	837	99	125	888	962
Clydesdale	121	138	17	25	138	163
Suffolk ...	147	176	7	6	154	182
Percheron	56	67	1	4	57	71
Others	—	—	38	55	38	55
Total Heavy Horses	1,113	1,218	162	215	1,275	1,433
Light :						
Hackney	17	11	5	5	22	16
Thoroughbred	131	140	3	3	134	143
Arab	9	9	3	3	12	12
Others	6	7	6	3	12	10
Total Light Horses	163	167	17	14	180	181
Ponies and Cobs :						
Welsh	10	8	—	1	10	9
Fell	3	9	—	1	3	10
Dales	7	9	5	6	12	15
Polo and Riding	9	10	3	1	12	11
Welsh Cob	12	17	8	8	20	25
Others	3	3	1	—	4	3
Total Ponies and Cobs	44	56	17	17	61	73
Totals ..	1,320	1,441	196	246	1,516	1,687

The number of stallions rejected for each of the prescribed diseases and defects was as follows:—

Whistling	6	Inadequate Prolificacy ..	3
Roaring	9	Bone Spavin	3
Sidebone	7	Stringhalt	4
Cataract	5	Defective Genital Organs	2
Shivering	2	Poor Conformation and	
Ringbone	3	Physique	1

Seven appeals were lodged against the Ministry's decision to refuse to grant licences, as compared with 10 in the previous year, and 5 of them were successful.

Inspection of Canadian Cattle.—The total number of cattle landed in Great Britain from Canada during the year

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ended March 31, 1935, was 47,850, which represented a reduction of 7,915 on the number landed in the previous year. The landings included 9,324 cattle that could be used for breeding purposes, this number showing an increase of 2,954 as compared with the previous twelve months.

Under the Ottawa Agreements Act, 1932, the Minister may require any Canadian cattle to be slaughtered within the landing place if, in his opinion, they could be used for breeding and are not suitable for that purpose. The 9,324 animals referred to in the previous paragraph were, therefore, inspected by the Live Stock Officers of the Ministry or of the Department of Agriculture for Scotland, with the result that 3,784 (or over 40 per cent.) were rejected as not being of sufficient merit to permit of their entry into Great Britain for breeding purposes, and were slaughtered at the ports. This compares with 1,498 (or 24 per cent.) condemned as unsuitable for breeding purposes in 1933-34.

Of the cattle rejected, 1,299 were bulls, and only 9 bulls were passed as suitable for breeding purposes in Great Britain.

The number of steers landed decreased from 49,395 in 1933-34 to 38,526 in the year under review.

Licensing of Bulls.— Figures are now available showing the working of the Improvement of Live Stock (Licensing of Bulls) Act, 1931, for the first twelve months of its operation. Whilst these figures are of considerable interest, it is necessary to exercise caution in their interpretation. It is inevitable for various reasons, some of which are referred to in subsequent paragraphs of this report, that the figures relating to the initial months of the operation of a new and far-reaching measure such as this Act should not present a full picture of the real position. It will only be after the experience of a few years of the operation of the Act that it will be possible to visualize its full scope and its possibilities, and to draw definite deductions from the statistics with safety. The Ministry has, therefore, considered it advisable to withhold for the time being any extended comments on the working of the Act.

Particulars of the numbers of applications dealt with from August 1, 1934, when the Act came into force, up to July 31, 1935, are given in Table VIII.

The Agricultural Returns for June, 1934, showed that nearly 97,000 bulls were being used for service in England

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TABLE VIII.

	England.	Wales and Monmouth.	Total.
Applications for licences received	24,631	3,638	28,269
Licences issued	19,550	3,057	22,607
Rejections notified	2,008	370	2,378
Permits issued	19	2	21
Licences suspended	23	18	41 (a)
Licences transferred	8,468	1,577	10,045
Licences expired	254	27	281
Appeals received	90	5	95
Appeals dealt with	84	5	89 (b)

(a) Licences suspended pending recovery of the bulls from temporary forms of disease (mainly ringworm).

(b) Of these 50 were decided in favour of the appellant and 39 in favour of the Ministry.

and Wales, and it might therefore have been expected that more than 28,269 applications for licences would be received in the first twelve months of the operation of the Act. There is some evidence that during this period a number of farmers did not realize their responsibilities under the Act and failed to apply for licences in respect of bulls that should have been licensed. Farmers whose bulls should have been licensed found various excuses for their failure to submit applications. Ignorance of the requirements of the Act was of course the chief reason, but apparently quite a number have held the view that no licence was required for a bull which was only being used on the owner's cows.

There were other factors that tended to make the number of applications smaller than might have been anticipated. It seems clear that many young bulls of a poor standard were castrated before the Act came into operation, and farmers are still voluntarily castrating animals that they feel will not be passed for licence. Many farmers also kept on their old bulls until they had had an opportunity of seeing the Act in operation.

Although applications for licences should be submitted sufficiently early to enable a licence to be granted by the time a bull reaches the age of ten months, experience shows that many farmers have been delaying their applications until they actually required the licences for some such purpose as sending the bulls to a sale, or were ready to use the bulls for service.

No prosecutions for evasion of the Act or for non-compliance with any of its requirements were undertaken by the Ministry during the first year of the working of the Act,

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since it was the policy of the Ministry to allow farmers to have every possible opportunity of becoming acquainted with the licensing procedure before any drastic steps were taken to deal with offenders under the Act. As arrangements were made for a leaflet drawing attention to the requirements of the Act to be distributed with the Agricultural Returns schedule in June, 1935, and as this leaflet reached every occupier of an agricultural holding exceeding one acre in extent, few bull-owners are now in a position to plead ignorance of the requirements of the Act.

The figures in Table VIII show that while 22,607 licences were issued during the twelve months ending July 31, 1935, only 2,378 bulls were rejected as unsuitable for licensing, or about 9.5 per cent. of the total number covered. Some interesting figures showing the numbers of bulls licensed and rejected in each county are given in Table IX.

TABLE IX
*Particulars of Bulls Licensed and Rejected in each County in
England and Wales up to July 31, 1935.*

County	Licensed	Rejected	County	Licensed	Rejected
England			Somersetshire ..	952	73
Bedfordshire ..	72	7	Staffordshire ..	744	138
Berkshire ..	208	14	Suffolk ..	289	59
Buckinghamshire ..	247	38	Surrey ..	206	12
Cambridgeshire ..	150	8	Sussex ..	575	33
Cheshire ..	803	144	Warwickshire ..	338	36
Cornwall ..	509	29	Westmorland ..	700	73
Cumberland ..	2,079	175	Wiltshire ..	684	60
Derbyshire ..	502	97	Worcestershire ..	198	24
Devonshire ..	560	26	Yorkshire ..	2,112	217
Dorsetshire ..	451	26			
Durham ..	521	34	Total—England	19,550	2,008
Essex ..	321	51	Wales and Monmouth		
Gloucestershire ..	406	14	Anglesey ..	52	7
Hampshire ..	539	14	Brecon ..	212	20
Herefordshire ..	598	23	Caernarvonshire ..	154	14
Hertfordshire ..	185	7	Cardiganshire ..	255	24
Huntingdonshire ..	46	7	Carmarthenshire ..	965	134
Isle of Wight ..	80	3	Denbighshire ..	314	43
Kent ..	286	10	Flintshire ..	237	30
Lancashire ..	732	118	Glamorgan ..	144	20
Leicestershire ..	287	27	Merionethshire ..	120	8
Lincolnshire ..	752	42	Monmouthshire ..	184	19
Middlesex ..	18	—	Montgomeryshire ..	202	30
Norfolk ..	254	56	Pembrokeshire ..	173	12
Northamptonshire ..	225	10	Radnor ..	45	9
Northumberland ..	494	69			
Nottinghamshire ..	191	39	Total—Wales and Monmouth ..	3,057	370
Oxfordshire ..	212	11			
Rutland ..	38	2	Total—England and Wales ..	22,607	2,378
Shropshire ..	746	182			

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It is not possible, from this table, to draw deductions as to the counties in which the best class of stock is to be found in the country. Whilst every effort is made by the Ministry's Live Stock Officers in carrying out their inspections of bulls to maintain the greatest degree of uniformity over the country as a whole, the standard of rejection must vary somewhat according to the standard of the stock in any particular district. It would therefore not be correct to assume that in a county that has a high rejection figure the general standard of the stock is inferior to that in a county that has a low rejection figure.

Further interesting information regarding rejections is given in Table X, which shows the numbers of each breed that were licensed and rejected. Deductions should, however, be drawn from these figures with caution, and it would not be safe to assume that the comparative number of rejections forms in any way a guide to the standard of the respective breeds.

TABLE X.
*Particulars by Breeds of Bulls Licensed and Rejected up to
July 31, 1935.*

	England		Wales and Monmouth		England and Wales	
	Licensed	Re-jected	Licensed	Re-jected	Licensed	Re-jected
Aberdeen Angus...	599	38	36	—	635	38
Ayrshire	183	18	9	—	192	18
Blue Albion	32	6	5	—	37	6
British Friesian ...	1,138	89	72	6	1,210	95
Devon	720	38	—	—	720	38
Dexter	8	—	1	—	9	—
Dun & Belted Galloway	13	1	—	—	13	1
Galloway	258	27	—	—	258	27
Gloucestershire ...	3	—	—	—	3	—
Guernsey... ..	961	34	8	1	969	35
Hereford	1,139	80	667	78	1,806	158
Highland... ..	2	—	—	—	2	—
Jersey	327	13	1	1	328	14
Kerry	12	—	1	—	13	—
Lincoln Red Shorthorn	1,091	87	18	2	1,109	89
Longhorn	2	1	—	—	2	1
Park	18	—	—	—	18	—
Red Poll	413	44	4	—	417	44
Shorthorn	11,999	1,199	1,909	220	13,908	1,419
South Devon	270	6	—	—	270	6
Sussex	161	7	—	—	161	7
Welsh Black	5	—	291	18	296	18
Cross-bred	196	320	35	44	231	364
	19,550	2,008	3,057	370	22,607	2,378

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The Act provides for the issue of a permit to enable a bull to be kept for any purpose other than breeding. Normally the only purpose for which a permit is required is to enable a bull to be kept for fattening, and the Ministry's policy in this respect has been to insist on castration, unless for any reason this operation could not be carried out. Only 21 permits had been issued up to July 31, 1935, and these were practically all in respect of "rig" bulls, which had been rejected for licensing purposes and which the owners desired to keep for a time for fattening.

(To be concluded)

PIG RECORDING IN HERTFORDSHIRE AND BEDFORDSHIRE

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ON the formation of the Hertfordshire Pig Industry Association in the spring of 1932, it was decided that one of its most valuable activities would be to provide facilities for the official recording of sows and litters, and after considerable investigation and discussion a Pig Recording Scheme was introduced early in 1933. The first litter was weighed in March, 1933.

Many problems arise in the production of pigs, whether for breeding purposes or for sale as porkers or baconers. Similar problems arise with all classes of live stock, and with dairy cows and poultry recording has been of the very greatest commercial value. There is no doubt that pig recording will also prove beneficial, and there is every reason to believe that in time it is likely to become indispensable, directly or indirectly, to all pig producers.

The main object of Pig Recording is to enable a producer to check his methods of feeding and management, and to guide him in the selection of suitable breeding stock. By measuring and recording what is actually taking place in a herd, recording provides the producer with a means of comparing his own results with recognized standards, and of determining weak points in his management.

Operation of the Scheme.—The Pig Recording Scheme of the Association provides for the measurement of the performance and management of sows and boars, and for the measurement of the performance of the progeny of recorded sows.

The details of the Scheme are given below:—

SCHEME I: (*Prolificacy, Rearing Capacity and Management*).

A. Sows.

The object of this Scheme is to measure the performance and management of sows by recording:—

(a) The number of pigs born per litter.

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(b) The number and weight of pigs when the litter is 56 days old.

(c) The frequency of the litters.

Any pure bred or first cross sow is eligible under the Scheme.

Procedure.

1. A member who desires any sow recorded must send notification of birth and full particulars, on a form which will be supplied, to the Secretary, within seven days of the birth of the litter.

2. A fee of 2s. 6d. per litter will be charged, and this fee should accompany the notification of birth.

3. The Recorder will visit the farm on or about the day when the litter is 56 days old, previous notice of day and time having been given. He will weigh the pigs in the litter and ear-mark them unless they are already marked under a private herd number or a breed society's regulations. He will also mark the sow unless she is already marked.

4. Surprise visits, for the purpose of checking records may be made by a representative of the Committee at any time.

5. Interim certificates of prolificacy, rearing capacity and management will be issued not later than fourteen days after the litter attains 56 days of age.

6. Each member taking part in the Scheme must purchase a weighing bag. The regulation bag must be obtained from the Secretary, and will be charged at cost price. This bag will remain on the farm and with care will last four or five years.

7. Each member should also arrange that at the time of the recorder's visit, the pigs are in a place convenient for the weighing and marking (if necessary), and that assistance is available for the purpose of catching the pigs for weighing and holding the pigs for marking.

B. BOARS.

Those taking part in Scheme I may have pedigree boars recorded. Boar records under this Scheme will be obtained by recording the number of pigs born alive in each litter from the recorded sows.

PIG RECORDING IN HERTS AND BEDS

Procedure.

1. A member who desires any boar recorded must send full particulars of the boar to the Secretary.
2. A fee of 2s. 6d., which should accompany these particulars, will be charged.
3. Not less than ten litters must have been recorded as the progeny of a boar before he is eligible for a certificate (see under Certificates).

SCHEME II: (*Rate of Growth and Carcass Quality*).

A. SOWS.

The object of this Scheme is to measure the performance of the progeny of recorded sows by recording:—

- (a) The age for weight.
- (b) The carcass quality.

Procedure.

1. A member who desires a record of rate of growth and carcass quality, must give notice to the Official Grader, Herts and Beds Bacon Factory, Hitchin, on a form to be supplied, not less than forty-eight hours before the pigs are to be slaughtered.
2. The Official Grader will check the ear numbers of the individual pigs and record their weight and grading after slaughter.
3. Interim certificates of rate of growth and carcass quality will be issued not later than fourteen days after slaughter.
4. A fee of 2d. per pig will be charged for this service. Such fee is payable to the Secretary on receipt of the interim certificate.
5. The only centre where these facilities are available is the Herts and Beds Bacon Factory, Hitchin.

CERTIFICATES.

Interim Certificates will be issued as stated under the separate sections.

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Certificates of Performance will be awarded under the following regulations:—

1. To Sows.

A Certificate of Performance (for Prolificacy, Rearing Capacity and Management), will be issued for pedigree sows provided that:—

- (1) They have produced the number and size of litters within the specified time which qualifies a sow for admission to the Advance Registry of the National Pig Breeders' Association, and
- (2) The average weight per pig for the best eight pigs in each of the qualifying litters is not less than 25 lb. at 56 days.

2. To BOARS.

A general condition for the issue of a Certificate of Performance for boars is that they must first be approved by an inspection committee of the Association.

A Certificate of Performance (Prolificacy) will be issued for pedigree boars, provided they have sired not less than ten recorded litters, in each of which not less than ten pigs have been born alive.

Results for 1933 and 1934.—*Scheme I.*—From March 1, 1933, to December 31, 1934, 718 litters were recorded as under:—

<i>Number of Herds.</i>				<i>Number of Litters.</i>		
	<i>Herts.</i>	<i>Beds.</i>	<i>Total.</i>	<i>Herts.</i>	<i>Beds.</i>	<i>Total.</i>
1933 ..	13	6	19	229	74	313
1934 ..	9	7	16	320	85	405

<i>Average Results.</i>						
		<i>No. born.</i>	<i>No. weaned.</i>	<i>Wgt. at 8 wks.</i>		<i>% Var.</i>
1933 ..	..	10.7	8.5	28.6 lb.		13.4
1934 ..	..	10.5	7.9	28.8 ..		12.9
Two years (weighted)	..	10.6	8.1	28 7 ..		13.1

Scheme II.—No records have so far been taken under this scheme.

PIG RECORDING IN HERTS AND BEDS

TABLE 1.--NUMBERS BORN AND WEANED (1933 AND 1934).

Average number born per Litter	Number of Litters	Total Pigs born	Total Pigs weaned	Average number weaned per Litter	Percentage loss : birth to weaning
20	1	20	6	6'0	70
19	—	—	—	—	—
18	4	72	39	9'7	45
17	5	85	51	10'2	40
16	14	224	141	10'1	37
15	24	360	228	9'5	37
14	71	994	659	9'3	34
13	72	956	665	9'2	29
12	82	984	747	9'1	24
11	101	1,111	901	8'9	19
10	112	1 120	921	8'2	18
9	78	702	620	7'9	11
8	54	432	371	6'9	14
7	39	273	239	6'1	12
6	25	150	131	5'2	12
5	19	95	84	4'4	11
4	9	36	29	3'2	19
3	5	15	14	2'8	6
2	2	4	4	2'0	—
1	1	1	0	0'0	100
Totals ...	718	7,614	5,850		
Averages	—	10'6	—	8'1	25

Table 1 shows the total number of pigs born and weaned in 1933 and 1934. The average number born per litter ranges from 1 to 20, each number within that range except 19 occurring at least once. An average of 10 born occurs the highest number of times and is closely followed by 11. Indeed, 213 litters or approximately 30 per cent. of the total number recorded show either 10 or 11 born. Next in order come litters of 12, 9, 13 and 14, and 516 litters are included in the 9-14 group, or just over 70 per cent.

In 154 litters, or 21 per cent. of the whole 8 pigs or fewer were born, and in 48 or just under 7 per cent. of the whole 15 or more pigs were born.

Bearing in mind the losses that occur between birth and weaning, and to which reference will be made later, litters in which 8 or fewer pigs are born are uneconomic, as on the average the number reared is bound to be under 7. As 21 per cent. of the litters fall into this group, attention to numbers born is important even though it is not of such great importance as numbers reared.

PIG RECORDING IN HERTS AND BEDS

Wastage between Birth and Weaning.—Considerable wastage occurs between birth and weaning, and in the absence of definite records of this wastage there is a tendency to regard it with complacency. The average wastage in the two years amounts to 23 per cent., or nearly one quarter of the pigs born.

The table shows that with litters of 12 or more born the wastage is above the average, and with litters of 11 or fewer born the wastage except in one instance is below the average. Large litters are therefore subject to heavier losses than small litters. To be sure of rearing 12 pigs a sow must have twelve functioning mammæ, and although definite information on this subject is not available at the moment, observations indicate that many sows are not so equipped, even if they possessed 12 mammæ as gilts. Breeders may therefore find it of value to pay close attention to this factor and to cull any gilts having fewer than twelve teats. Sows that have lost mammæ through mammitis should likewise be culled where necessary.

Records that have been kept of the reasons for the death of suckers show that by far the greater proportion of these losses is due to crushing by the sow. Large and small litters alike are affected, and this factor is mainly the cause of the high wastage. It is unfortunate that there should be so much wasted effort on the part of the sow, and one of the biggest problems before the breeder is the saving of the young pigs.

Chilling is another common cause of loss, and it is significant that in one herd recorded in 1934 the average wastage was under 6 per cent. The breeder concerned has fitted hot water pipes along the back of his range of farrowing pens. These are heated from a coke boiler, and there is no doubt of the efficiency of the method. Other mechanical aids, such as farrowing crates, electric heaters, hovers, etc., are well worth trying in an endeavour to reduce losses.

There is one further point in this connexion. Individual sows are known to rear consistently a high proportion of the pigs born, and in this way appear to be highly endowed with "mothering" qualities. If this is an inherited characteristic it might be well worth developing.

Table 2 shows the percentage of litters of each number in which every pig born was reared. As is to be expected the smaller the litter the higher is the percentage of litters in which every pig born is reared. It is, however, very

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gratifying to note that in just over 26 per cent. of all the litters recorded, every pig born was reared.

TABLE 2.—LITTERS IN WHICH ALL PIGS BORN WERE REARED (1933 AND 1934).

No. born and reared	No. of Litters	Percentage of Total Litters in which the same number of Pigs were born
1	—	—
2	2	100
3	4	80
4	6	66
5	13	68
6	15	60
7	21	54
8	23	43
9	34	43
10	31	28
11	22	22
12	12	14
13	5	7
14	2	3
Totals ...	190	26

TABLE 3.—WEIGHTS OF PIGS AT 56 DAYS OLD, 1933 AND 1934.

Average number weaned per Litter	Number of Litters	Total Pigs weaned	Total weight of Pigs at 56 days	Average weight per Litter	Average weight per Pig	Percentage variation in weight per Pig
0	10	—	—	—	—	—
1	2	2	49·9	24·9	24·9	—
2	6	12	265·0	44·1	22·0	7·6
3	16	48	1,256·7	78·5	26·2	12·9
4	21	84	2,460·4	117·1	29·3	12·2
5	45	225	6,936·5	154·1	30·8	13·4
6	62	372	11,886·6	191·7	31·9	12·2
7	80	560	16,960·2	212·0	30·3	12·0
8	129	1,032	30,949·9	239·9	30·0	13·5
9	120	1,080	29,853·2	248·8	27·7	13·9
10	117	1,170	32,531·7	278·0	27·8	14·0
11	67	737	20,563·0	306·8	27·9	13·6
12	33	396	10,848·1	328·8	27·4	14·2
13	8	104	2,768·6	346·1	26·6	15·3
14	2	28	876·4	438·2	31·3	18·2
Totals ...	718	5,850	168,206·2	—	—	—
Averages	—	—	—	234·2	28·7	13·4

PIG RECORDING IN HERTS AND BEDS

Weight of Pigs at Weaning.—Table 3 shows the weight of the pigs at weaning arranged according to the size of the litter, and also the percentage variation in the weight of the pigs.

The average weight per pig over the two years is 28.7 lb., and this weight is only exceeded in those litters in which 4, 5, 6, 7, 8 and 14 pigs are reared. The natural assumption would be that the more pigs in the litter the lower would be the weight of the individual pigs, but from the figures here shown it is evident that there is no definite falling off with the bigger litters. Thus litters of 4, 5, 6, 7 and 8 show a variation in weight of only 11.8 per cent. from a mean of 30.5 lb., and litters of 9, 10, 11 and 12 show a variation in weight of under 3 per cent. from a mean of 27.7 lb. Litters of 4-8 show only 10 per cent. heavier weight per pig than litters of 9-12. It is therefore suggested that while the weight per pig, in litters of 8 or fewer, is heavier than it is in litters of 9 or more, the difference is not sufficient to compensate for the smaller number of pigs weaned, and that in litters of 9-12 the differences in weight per pig are insignificant.

It is probable that it is as easy to rear 12 as it is to rear 9 pigs, and that small litters have no marked advantage in weight per pig over large litters. This suggests that management is the key to the situation. Some form of "creep" feeding is doubtless of great value in weaning pigs at good weights and in fit condition.

The average weight of 28.7 lb. per pig secured in these records is very creditable, in view of a recognized standard of 25 lb. *Emphasis on average weight per pig should only be equal with emphasis on the number of pigs weaned*, but two points in this connexion are worth noting: (1) from preliminary investigations on weaning weights and carcass quality, Dr. Hammond indicates that high weights at weaning may be co-related with good carcass quality and vice versa, and (2) the records of the regular weighings of pigs at the Hertfordshire Institute of Agriculture indicate that the "bad doers" are pigs that weighed under 20 lb. at weaning.

Variation in Weight.—Regular marketing of bacon pigs by contract necessitates an even flow of pigs throughout the year, and breeders and feeders are well aware of the variation that occurs in the rate of growth of individual

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pigs. This involves a certain waste in the utilization of the feeding pens, and if it is possible by breeding to secure litters of even growth the effort is well worth while.

In the 718 litters recorded the average variation in weight at 56 days old was 13.4 per cent., but individual litters varied from as low as 0.6 to as high as 37.5 per cent. This means that with pigs averaging 25 lb. at 8 weeks, the range was from $23\frac{3}{4}$ lb. to $26\frac{1}{4}$ lb. on the average, but that in individual cases it might be from $20\frac{1}{2}$ lb. to $29\frac{1}{2}$ lb. In practice, however, it is usually one or two very light pigs in an otherwise good litter that cause wide variation from average.

Level litters are of greater value than uneven litters, and as there are indications that individual sows consistently rear level litters, the selection of breeding stock from these sows may prove useful.

Small litters tend to be more level than large litters but the table shows that the percentage variation is fairly constant as between litters of 8 to 12 pigs reared. Large litters may equally well be associated with even litters.

TABLE 5.—BREED AVERAGES, 1933 AND 1934.

Breed	Number of Litters	Average number born	Average number weaned	Average weight per Pig	Percentage variation
				lb	
Large White	446	11.0	7.9	28.8	13.2
Wessex ...	81	10.5	9.0	31.8	12.8
Essex ...	66	9.5	8.8	27.2	14.2
Large Black	52	9.0	7.8	27.0	11.3
Middle White	19	10.7	8.5	26.8	16.0
Crossbred ...	54	10.5	7.9	27.5	12.3
Total ...	718	10.6	8.1	28.7	13.4

Table 4 shows the results of the two years, averaged according to breeds. By far the largest number of records taken is for Large Whites, with 62 per cent. of the total records. In view of the large number it is most creditable that in numbers born, weight at weaning and percentage variation in weight the breed is superior to the average, while for numbers weaned it is only 0.2 below average.

Next in numbers recorded comes the Wessex breed, which in numbers weaned, weight at weaning and variation in

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TABLE 6.—HERD AVERAGES, 1933 AND 1934.

Herd No.	Number of Litters	Average number born	Average number weaned	Average weight per Pig	Percentage variation
				lb.	
A	130	10.9	8.2	32.5	13.6
B	129	10.8	7.7	24.1	14.1
C	67	11.2	8.5	31.7	11.0
D	57	9.4	8.8	25.9	14.8
E	54	10.4	7.7	26.7	12.4
F	49	11.0	8.0	26.4	13.3
G	37	11.1	7.7	28.2	12.4
H	33	9.3	8.1	25.7	10.9
I	24	9.8	7.8	27.5	13.4
J	22	10.9	8.4	31.4	13.2
K	21	11.3	7.6	34.3	10.8
L	21	10.4	8.5	27.3	16.5
M	19	10.8	8.1	34.0	11.7
N	16	11.1	9.0	32.2	14.2
O	13	8.6	8.0	30.5	10.6
P	9	10.8	10.1	37.8	13.5
Q	6	9.3	8.7	23.7	13.1
R	5	9.8	9.4	29.2	13.4
S	3	12.3	9.3	34.2	15.3
T	3	8.7	7.3	30.9	10.7
Total	718	10.6	8.1	28.7	13.4

weight is considerably superior to the average. In numbers born it is only 0.1 below average.

In the other breeds recorded the performances are not quite so good, but it is scarcely fair to draw conclusions from a comparatively small number of results.

Table 6 shows the results of the two years averaged according to herds. The list has been prepared according to the number of litters recorded in each herd, and no attempt has been made to assess the relative value of the different herds.

The following herds, however, are to be congratulated on their really excellent performance: A, C, J, M, N, P, R, S. In each of these herds the number weaned and the weight at weaning is either average or above average.

Conclusion. —A perusal of the foregoing notes brings out several of the big problems which the breeder has to face. It is clear that they only touch the fringes of these problems and that much work still remains to be accomplished. Only by recording what actually does occur do we obtain definite information from which it is possible to build up a policy for the future.

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It is certain, too, that although the information obtained from Scheme I is of very great value, progress will not really be made until Scheme II is taken full advantage of. Breeders who follow their results from birth to slaughter will be in a strong position to formulate a progressive breeding policy. The time is coming when full records of this nature will be looked for.

ACKNOWLEDGMENTS.—The successful organisation of pig recording under the Association has only been made economically possible by the co-operation of the Hertfordshire County Council, and the Hertfordshire and Bedfordshire Milk Recording Societies. To these bodies and particularly to the field staffs of the Milk Recording Societies grateful acknowledgment is made.

REPORT ON THE WORK OF THE EDUCATION AND RESEARCH DIVISION OF THE MINISTRY, 1933-34*

II. AGRICULTURAL EDUCATION

THIS report relates, so far as concerns agricultural education provided by local authorities, to the second complete year (April, 1933, to March, 1934), during which the economy measures introduced in September, 1931, were operative. As explained in previous reports, these measures had hardly made themselves felt beyond their initial impact before the close of the financial year 1931-32; and it was not before 1932-33 that it was possible to assess their financial result, and to draw some conclusions as to their effect on the different branches of work.

As the conditions of 1932-33 have been continued in 1933-34 almost without change, it may be convenient to recall again the measures taken by the Ministry in restricting the funds available for agricultural education after the financial crisis of 1931. In agricultural education administered by local authorities the principal measure was the reduction, as from October 1, 1931, of grants in aid of maintenance expenditure to the uniform rate of 60 per cent.: and local authorities were informed that only in very exceptional circumstances would funds be available to aid fresh developments. It was possible last year to see the practical effect of this policy. In 1932-33 a sum of approximately £40,000 was saved by local authorities compared with their expenditure on this service in 1930-31. This saving, spread over the counties of England and Wales represented small economies such as less travelling, fewer advisory visits, in some instances the loss of a member of the staff or a part-time instructor, but not generally the loss of any essential service. The experience of a further year's working on this basis has confirmed the Ministry's opinion that the economy measures, unwelcome and indeed severe as in certain instances they were found to be, did not seriously impair the main structure of county agricultural education. It nevertheless remains true that in 1933-34

* Part I of this Report dealing with Agricultural Research (including Local Investigation and Advisory Work) appeared in the issue for last month (October).

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much useful work was held up, and it is difficult to contemplate that the service can remain indefinitely on its present restricted level. In Wales, a slightly higher total expenditure is recorded, but the expenditure of local authorities in England shows a further slight fall. This reduction, it may be explained, should not be taken as necessarily indicating a further curtailment of work: it is due, at least in part, to better results from farm trading in certain counties where educational farms are maintained, and it may therefore be a slight but encouraging sign of improved conditions. It will be seen also that the numbers of students in attendance at the courses organized by local authorities have been well maintained. It is not surprising that there should be a slight reduction, and it is satisfactory that in no case, except in the correspondence courses, has the decline in numbers been at all substantial.

The maintenance grants paid to agricultural colleges and university departments of agriculture remained almost unchanged. An increased grant of £500 (total £5,800) was paid to Reading University in aid of the new Chair of Horticulture, and as a temporary measure the grant to the Midland Agricultural College was reduced by £600 to £2,250. As with the local authorities, the colleges and university departments have passed through the financial crisis without their efficiency being seriously impaired. It is known, however, that some of them have been existing on a "poverty basis" on which they cannot be expected to continue for any length of time; but the year 1933-34 was the last year of maintenance grants at the old level: for 1934-35 and subsequent years they have been re-assessed.

It is gratifying to note that the numbers of students at these institutions in 1933-34 were higher than for some years past.

A. HIGHER AGRICULTURAL EDUCATION AT UNIVERSITIES AND AGRICULTURAL COLLEGES.

(i) **Maintenance Grants.**—As explained in previous reports, the annual "block" grants to university departments and agricultural colleges, which it was intended to assess on a five-year basis were due for revision in 1930; but the recommendations of the Re-assessment Committee were not received until the summer of 1931, and the financial crisis necessarily rendered inoperative many of the Com-

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mittee's proposals. The grants of 1930-31 remained as a basis; but reductions varying from 2 to 10 per cent. were made as from October 1, 1931, and with one exception, viz., the Midland Agricultural College (the finances of which appeared able to stand a larger reduction), these revised grants were paid again in 1933-34. In the case of Reading University, however, an increase at the rate of £1,000 a year was sanctioned for the establishment of a Chair of Horticulture at the University, one-half becoming payable in the year 1932-33 and the full amount in 1933-34. On balance, the maintenance grants paid to agricultural colleges and university departments of agriculture showed a reduction of £100 on last year.

GRANTS TO COLLEGES AND UNIVERSITY DEPARTMENTS

<i>Institution.</i>	<i>Grant in respect of the Academic year</i>		
	1931-32	1932-33	1933-34
	£	£	£
Armstrong College, Newcastle-on-Tyne ..	3,400	3,400	3,400
Cambridge University: School of Agriculture ..	5,850	5,850	5,850
*Harper Adams Agricultural College ..	3,900	3,900	3,900
Liverpool University (School of Veterinary Science) ..	2,700	2,700	2,700
Midland Agricultural College ..	2,850	2,850	2,250
Oxford University: School of Rural Economy ..	3,600	3,600	3,600
Reading University: Faculty of Agriculture and the British Dairy Institute ..	4,800	5,300	5,800
Royal Agricultural College, Cirencester ..	1,900	1,900	1,900
Royal Veterinary College ..	5,000	5,000	5,000
South Eastern Agricultural College, Wye ..	3,700	3,700	3,700
Seale Hayne Agricultural College ..	2,200	2,200	2,200
Studley College (for women) ..	950	950	950
Swanley Horticultural College (for women) ..	1,700	1,700	1,700
University College of North Wales, Bangor ..	6,800	6,800	6,800
University College of Wales, Aberystwyth ..	6,800	6,800	6,800
Leeds University ..	3,600	3,600	3,600
	£52,950	£53,450	£53,350

*Grants of £2,575 and £2,450 were also paid to the National Institute of Poultry Husbandry and Harper Adams Agricultural College in respect of the financial years 1932-33 and 1933-34 respectively.

(ii) **Capital Grants.**—The Ministry's commitments in respect of capital development in 1933-34, were only £483. A sum of £333 was paid to Reading University towards the provision of a horticultural laboratory: the remaining £150 was a grant to Wye College in aid of interest charges incurred on a loan for the acquisition of the College farm. Apart from these small sums no capital grants were made.

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(iii) Students.—The following statement shows the numbers of students in attendance at institutions for higher agricultural (including veterinary) education during the past five years :—

1929-30	..	..	1,896
1930-31	..	..	1,948
1931-32	..	..	2,064
1932-33	..	..	1,994
1933-34	..	..	2,250

The numbers of students taking the different courses provided were as follows (in some instances students took more than one course) :—

<i>No. of student courses.</i>	<i>Subject of course.</i>
956	Agriculture
310	Horticulture
192	Dairying
143	Poultry Husbandry
503	Veterinary Science
367	Miscellaneous

These figures show generally a substantial advance on last year: indeed the total number of students this year is well above the number recorded in any year for the past six years. There was a slight falling off in the dairying courses, but the numbers attending general courses in agriculture, horticulture and poultry husbandry are all improved, and the increase is again marked in veterinary science. Apart from these regular courses, occasional or miscellaneous courses at agricultural colleges, etc., showed a decided increase in attendance.

B. AGRICULTURAL EDUCATION PROVIDED BY LOCAL AUTHORITIES.

(i) Maintenance Expenditure.—The following table shows the expenditure incurred by county authorities during the past seven years in maintaining their schemes of agricultural education, together with the amounts of grant-in-aid paid by the Ministry.

It should be mentioned that the increased expenditure in 1930-31 was due to extensions and improvements in their existing schemes, made by the counties in response to the Department's circular letter of November, 1929. The decline both in expenditure and grants-in-aid observed in 1931-32 is due to the economy "cuts" that began to operate towards the end of the year, and to the reduction

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Year	Expenditure			Grants		
	England	Wales	Total	England	Wales	Total
	£	£	£	£	£	£
1927-28	265,705	+5,664	311,369	177,989	31,529	209,518
1928-29	255,948	+1,513	297,461	171,569	28,767	200,336
1929-30	261,838	+0,614	302,452	175,480	28,175	203,655
1930-31	319,275	+9,570	368,845	213,842	33,664	247,506
1931-32	309,730	50,603	360,333	194,807	32,563	227,370
1932-33	281,370	47,860	329,230	163,584	28,715	192,299
1933-34	275,546	48,125	323,721	161,786	28,875	190,661

in the rates of grant from October 1, 1931; the further decline in 1932-33 shows the effect of these measures over a full year of operation. In 1933-34 there was a slight rise in expenditure in Wales, but this was offset by the decline—not, however, very substantial—in the expenditure on agricultural education in England. As already explained, this decline may not represent an actual loss to the service.

Grants totalling £2,021 were also paid during 1932-33, to county borough authorities in aid of schemes of agricultural and horticultural education, and £313 to the London County Council in respect of evening classes in horticulture, bee-keeping and poultry-keeping, etc.

(ii) **Capital Expenditure.**—The only grant-in-aid of capital expenditure made to local authorities during the year was a grant of £712 to the Monmouth County Council towards the cost of completing the new women's hostel at the Usk Farm Institute.

(iii) **Courses of Instruction.**—The following table gives particulars of the courses of instruction, lectures, etc., arranged by local authorities during the past five years. Of the 22,198 students who received some form of instruction in 1933-34, over one-quarter were women, who were mainly taking courses in dairying, poultry-keeping and rural domestic economy.

Most of the farm institutes were quite full, and in some instances it was necessary to have recourse to outside residential accommodation where conveniently available.

(iv) **Scholarships.**—During the year under review 1,222 agricultural scholarships were awarded by local authorities, the total cost involved being £21,500. The corresponding figures for the previous year were 1,353 scholarships and £22,550.

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COURSES.

	1929-30	1930-31	1931-32	1932-33	1933-34
Farm Institute, etc.,					
Courses					
No. of Courses ..	102	111	133	174	191
No. of Students ..	1,120	1,415	1,618	2,056	1,889
Organized Day Courses					
No. of Courses ..	317	330	462	424	524
No. of Students ..	3,335	3,766	5,380	5,596	6,173
Evening Classes					
No. of Courses ..	378	424	456	479	519
No. of Students ..	8,976	9,819	11,514	12,307	11,534
Correspondence Courses					
No. of Courses ..	9	5	7	13	5
No. of Students ..	208	111	114	286	86
Instruction in Agricultural					
Manual Processes*					
No. of Courses ..	440	421	265	297	282
No. of Students ..	3,503	3,795	2,288	2,422	2,516
Lectures, Demonstrations					
and Other Meetings					
No. of meetings ..	10,185	11,281	10,617	10,465	10,028

* Ploughing, hedge-laying, ditching, thatching, sheep-shearing, basket-making, hurdle- and spar-making, milking, etc.

(v) **Staff and their Advisory Work.**—Of the 62 administrative counties in England and Wales, 4 (Hunts, Isle of Ely, Isles of Scilly and Soke of Peterborough), do not employ agricultural organizers. In the remaining 58 counties, 54 organizers are employed. The Professor of Agriculture at Leeds University acts as head of the agricultural education staff for the three Ridings of Yorkshire; and a joint arrangement of one organizer serving two counties operates for Cumberland and Westmorland, and for Brecon and Radnor. The organizer is generally assisted by a staff of experts in subjects allied to agriculture. The total number of full-time instructors is 358, and the following list shows the number of each type employed. Many part-time instructors in the various subjects are employed in addition to the following classified full-time instructors:—

Agricultural Instructors (in general agriculture, economics, chemistry, biology, mycology, etc.)	100 in 37 counties
Horticulture	93 " 55 "
Dairying	55 " 35 "
Poultry-keeping	66 " 46 "
Dairying and Poultry-keeping (combined) ..	14 " 12 "
Farriery	3 " 3 "
Bee-keeping	4 " 4 "
Veterinary Science	4 " 4 "
Farm Accounting	3 " 3 "
Rural Domestic Economy (fruit and vegetable preservation, etc.)	4 " 4 "
Manual Processes (hedging, ditching, pruning, grafting, woodwork, etc.)	11 " 7 "
Agricultural Engineering	1 " 1 county

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In addition to the organized instruction given to students and the management of county farm institutes, experimental stations, demonstration plots and egg-laying trials, the county staffs serve the industry in an advisory capacity. The following table indicates the extent of these advisory services rendered by county staffs during the year 1933-34:—

<i>Subject.</i>	<i>Visits paid.</i>	<i>Corres- pondence.</i>	<i>Visits to markets, calls at office, telephone, etc.</i>
Agriculture ..	24,914	30,583	42,651
Horticulture ..	23,279	24,570	14,579
Dairying	14,140	9,435	5,695
Poultry-keeping ..	23,297	19,784	17,541
Bee-keeping	5,418	2,870	605
Other subjects ..	2,898	3,276	783
	<u>93,946</u>	<u>90,523</u>	<u>81,914</u>

The remark made last year that the interest taken by farmers in the new marketing developments was causing much labour applies with equal force this year. It has meant generally that county staffs have worked under heavy pressure. In a few instances it has been found possible to make small improvements in staffing arrangements at the expense of other activities; but there is no doubt that further increases in staff will be required in the near future, if an adequate advisory service is to be maintained.

C. DAIRYING.

The most notable event in the dairy industry in 1933-34 was the establishment of the Milk Marketing Board, which became responsible for all sales of milk other than certain classes of designated milk, as from October 1, 1933. The feeling of uncertainty that had preceded the setting up of the Board is probably reflected in the somewhat lower number of students who took dairy courses at agricultural colleges and farm institutes during the year. The Board was not able at its inception to introduce any scheme for sales on a hygienic quality basis or for giving a preferential price to producers of a cleaner milk: it was made clear, however, that the Board proposed to bring into effect a scheme for the encouragement of clean milk production without delay, and in the meantime the educational work that the Ministry had hitherto prosecuted in this direction was continued. Here also the uncertain atmosphere of a

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transitional period probably had some effect in limiting progress, particularly in respect of clean milk competitions.

Courses of Instruction.—The number of students who were taking regular courses in dairying at agricultural colleges and farm institutes during 1933-34 was 732, i.e., 192 at agricultural colleges and 540 at farm institutes; the previous year's total was 1,058.

The courses at agricultural colleges may be full-time courses proceeding to a degree or diploma in dairy husbandry, as at Reading, or they may form part of the general agricultural course. The arrangements at farm institutes provide for short courses of six months especially for women students, the men students generally taking dairy husbandry in their agricultural course. The instruction given at farm institutes is of a more elementary and practical type than that at agricultural colleges; it is designed to train men and women capable of taking the more responsible posts among farm workers. Special courses are generally arranged for short periods of a few weeks, for the instruction of local groups in the technique of butter- or cheese-making, or of farm workers in hygienic methods of milking.

While complete returns of the number of persons who attended decentralized lectures and demonstrations are not available, there is reason to believe that the figures are not substantially below those of last year, viz., 43,000.

Clean Milk Production.—As explained in the previous year's report, the Ministry has made efforts for some thirteen seasons to stimulate the production of clean milk through the organization of clean milk competitions in the counties, and as experience was gained other forms of activity directed to the same end were developed. First introduced in Essex in 1920, the clean milk competition scheme has been generally taken up by local authorities throughout the country, and in all the important dairy districts such competitions have formed a regular feature of the county educational schemes. Uniformity has been secured through the Ministry's "Guide to the Conduct of Clean Milk Competitions" first issued in 1924, in which a definite plan is laid down for farm inspections and the taking of samples for bacteriological examination. In 1933-34, 26 clean milk competitions were started in England and Wales.

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During the past thirteen years approximately 6,000 dairy farmers have taken part in these competitions. Although this figure represents only about 1 in 30 of the dairy farmers of the country, it must be remembered that the beneficial influence of the competitions extends far beyond the competitors. A general knowledge of the methods employed and the standards to be aimed at spreads throughout the country and has an indirect, but appreciable, influence in improving the quality of the milk produced.

County Registers of Accredited Producers.—For dairy farmers who have passed through a clean milk competition and who require some organized means to enable them to maintain their standard of production, county registers of accredited producers were instituted. The scheme was first introduced in Wiltshire in 1929, and in 1933-34 it was in operation in 11 counties. Briefly, the scheme provided for the registration of producers who had obtained $66\frac{2}{3}$ per cent. of the marks available in a county clean milk competition of six months' duration (or in a "probationary" inquiry conducted on similar lines). Samples of milk from all accredited producers on the register were examined each month, and each sample was expected to conform with the following standard:—

Bacterial count not exceeding 300,000 per c.c.
Bacillus Coli absent in 1/100 c.c.

A producer who failed to conform with the standard in three consecutive months was suspended from the register until such time as he submitted three consecutive satisfactory samples. The figures in respect of this scheme for the year ended December 31, 1933, may be summarized as follows:—

Number of county educational authorities concerned	11
Total number of registered producers	265
Total number of samples examined	2,353
Total number of samples that conformed with the standard laid down in the scheme	1,738

As mentioned in previous reports, certain distributive firms made use of the clean milk competition or the register of accredited producers in connexion with the payment of a bonus for milk of high standard. This scheme may be regarded as a first attempt at something on the lines of the Milk Marketing Board's scheme for a Roll of Accredited Producers, by which it has now been superseded.

Advisory Schemes.—An advisory service that includes the bacteriological examination of milk samples is available

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in 23 counties for licensed producers of designated milks and others (e.g., farmers who have qualified for a certificate in a clean milk competition), in order that such producers may be able to maintain their standard of efficiency.

Courses for Sanitary Inspectors.—Four courses were held in 1933-34—much below the previous year's record. It is to be hoped that there may be a demand for these useful courses in the future, in the new conditions prevailing on the introduction of the Milk Marketing Board's Roll of Accredited Producers.

Milk Control Exhibit.—During the year, an exhibit on methods of clean milk production, the hygienic handling of milk, etc., originally prepared by the Ministry's officers for the National Federation of Dairymen's Show at Olympia in January, 1933, was, at the request of local educational authorities, shown at a number of agricultural and public health exhibitions throughout the country.

D. POULTRY AND SMALL LIVE STOCK.

Under this head, the work of the Ministry includes assistance, advice and financial aid to authorities who provide instruction in poultry subjects at farm institutes and by means of an advisory service; it is concerned also with the framing and administration of practical schemes for the improvement of live stock, e.g., the county egg-laying trials, the accredited poultry-breeding stations scheme and the cockerel-breeding schemes; and the general administration of the National Poultry Institute scheme. As regards other small live stock, attention is given mainly to the keeping of goats and rabbits.

Instruction and Advisory Services.—As explained in previous reports, courses of instruction in poultry husbandry at agricultural colleges may be of one or two years' duration, and conform generally to the standard required for the National Diploma in Poultry Husbandry. In farm institutes shorter courses are given, though many institutes provide a year's course. Students who cannot comply with the regulations for the National Diploma in Poultry Husbandry (which require a year's experience on an approved poultry farm) are now able to prepare themselves for the recently established national certificate in poultry practice, which can be obtained by examination after a

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year's course in theory and practice at an approved institution.

Courses in poultry husbandry are still very popular both with men and women students. The number of students who took the advanced courses at the National Institute of Poultry Husbandry in 1933-34 was 32; in the agricultural colleges the poultry students numbered 143; and at farm institutes 445 poultry students were enrolled during the year; making a total of 620. Except for the National Institute of Poultry Husbandry, where there was a slight decline, these figures represent a substantial advance on last year.

For the assistance of the practising poultry farmer, local authorities have instituted an advisory service through the appointment of county poultry instructors who are available to give advice to all poultry keepers in their area on points of practical difficulty. During the winter months local lectures on poultry subjects are arranged in nearly all counties.

County Egg-laying Trials.—In 1933-34, trials under the Ministry's scheme were conducted by 39 counties, the same number as in 1932-33. The number of birds competing was 9,126 in 1933-34, as against 9,105 in the previous season. For the year under review, the regulations as to the scoring points were subject to revision with the object of giving due credit to birds that lay most heavily in the winter months. The average egg production during the season's trials was 177.50 per bird as against 181.87 in 1932-33 (the decrease being due no doubt to the heavier toll in mortality which was generally experienced during this period.) The leading county in the season's trials was Lancashire, which won for the first time the Gold Cup presented by the Millers' Mutual Association.

As mentioned last year, the death rate among high-grade stock has been giving rise to anxiety among poultry breeders for some years past, and the incidence of mortality at county laying trials leaves no doubt of its seriousness and growing importance. During the last seven years there has been a steady rise in the percentage of mortality recorded, from 5 per cent. on 2,800 birds in 1927-28 to 13.5 per cent. in 1933-34 when 9,126 birds were entered in the trials.

Accredited Poultry-breeding Stations.—During the season 1933-34, the Accredited Poultry-Breeding Station

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Scheme was in operation in 26 counties, and the station holders numbered 161, as compared with 17 counties and 121 station holders last year. The Ministry has issued model regulations governing the classes of stock that are to be allowed under the scheme, and the conditions as to testing birds for freedom from bacillary white diarrhoea. A national register has been compiled, which it is proposed to re-issue annually, containing particulars relating to all the station holders throughout the country.

Cockerel-breeding Scheme.—This scheme aims at the distribution of approved cockerels bred from first-class hens that have been awarded the special merit certificate at county laying trials. It was begun in a tentative way by a single county in 1928-29 and was operated in 1933-34 by three counties. The scheme is still in an experimental stage, and the Ministry has not yet found it desirable to issue model regulations.

National Poultry Institute Scheme.—The following brief notes will suffice to indicate the nature of the experimental and research work in progress under the National Poultry Institute Scheme; for further particulars reference should be made to the annual report issued by the Ministry on the work of the Research Institutes.

(a) *National Institute of Poultry Husbandry.*—During 1933-34 the experimental work was concentrated on a few important issues. The main work consisted in the trial of rations to test the value of different constituents, and in the trial of various classes of stock under different systems of management.

(b) *Ministry's Veterinary Laboratory, Weybridge.*—The work on tuberculosis in poultry has been continued and extended. Outbreaks of disease among ducklings have claimed attention during the year. In addition, the investigation of other diseases, including Newcastle disease, fowl cholera, and coccidiosis, has been continued.

(c) *School of Agriculture, Cambridge.*—Work has been continued on the effect produced on the quality of both eggs and carcass by feeding fatty materials, etc.; it has reached a stage where information of practical importance can be given to poultry-keepers.

(d) *Breeding Work on Poultry at Cambridge.*—The study of the inheritance of fecundity has been continued; further investigations are being made into the new breed of dark runner ducks that give a sex-linked result with fawns. Progress has been made with the improvement of the Cambar from a commercial standpoint.

(e) *Northern Breeding Station, Reaseheath.*—The new series of experiments has been continued. It includes (a) a cross-breeding experiment to study the value of the first cross against the pure breed, (b) an attempt to produce a strain of commercial poultry capable of

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withstanding continuous in-breeding, and (c) a study of the inheritance of fertility in White Wyandottes.

(f) *Southern Table Poultry Experiments at Wye*.—The investigation in 1933-34 was mainly concerned with the different methods of conditioning of table birds.

Stud Goat Scheme.—This scheme, the local administration of which is in the hands of the British Goat Society, aims at encouraging the keeping of goats of improved milking quality by small breeders, etc. Services by approved stud goats are available at a charge of not more than 4s. a service, and a number of premiums are awarded to qualified goats. During 1933-34, goats were stationed at 89 centres approved under the scheme, and the number of premiums awarded was 1,665. The Ministry made a grant towards administrative and travelling expenses and the cost of the premiums awarded.

E. MISCELLANEOUS.

(i) **Scholarships for the Sons and Daughters of Agricultural Workmen and Others.**—The scheme under which these scholarships are awarded was established in 1922 and owes its inception to the Corn Production Acts (Repeal) Act, 1921. Its main objects are (a) to offer to children of agricultural workmen a chance of obtaining a sound technical training in agriculture, and (b) to improve the standard of agricultural production by returning annually to the industry a body of young men and women skilled in the practice of agriculture, and not without knowledge of its scientific basis.

Benefits under the scheme are confined to (a) sons or daughters of agricultural workmen, or of working bailiffs and smallholders whose means are comparable with those of agricultural workmen; (b) sons or daughters of other rural workers whose means and method of livelihood are comparable with those of agricultural workmen; and (c) *bona fide* workers in agriculture.

Awards are of three types, namely, (1) Junior scholarships tenable at farm institutes and similar institutions for courses, not exceeding one year, in agriculture, horticulture, dairying or poultry husbandry, or in a combination of two of these subjects; (2) Extended Junior scholarships for advanced or specialized courses of instruction, not exceeding one year, at farm institutes or agricultural colleges (these awards are reserved for those who have already held Junior scholarships); and (3) Senior scholar-

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ships tenable for degree or diploma courses in agricultural subjects at university departments of agriculture or agricultural colleges, or for courses in veterinary science at veterinary colleges. All awards cover the whole cost of instruction while students are at the training institutions, and in addition provide for the payment of allowances on a scale sufficient to meet ordinary living expenses adequately, but economically, at the institutions concerned.

During the thirteen years the scheme has been in operation (1922-34) assistance has been granted to more than 1,400 individuals, involving the award of 1,622 scholarships. Of these, 77 were for degree courses extending over three or four years, 97 for two-year diploma courses, and 1,448 for farm institute courses. The distribution of the awards among the various classes of beneficiary is as follows:—

			<i>Twelve years</i>		<i>Total</i>
			1922-33	1934	
Sons or daughters of agricultural workmen			397	38	435
" " working farm bailiffs			116	10	126
" " smallholders			374	29	403
" " other rural workers			236	19	255
Candidates who qualified on their own account as <i>bona fide</i> workers in agriculture			371	32	403
			1,494	128	1,622

The after-careers of the 1,170 students who have completed courses of instruction have been followed up; it is satisfactory to find that the training provided by the scheme has had good results on their subsequent careers. Many past students have succeeded in improving their positions substantially and a number now hold important posts (scientific and other) in the industry. The latest information shows that about 10 per cent. (principally ex-senior scholars) hold administrative, teaching, research or advisory appointments of an agricultural nature, while a further 17 per cent. occupy posts of a supervisory character as managers of farms, nurseries, dairies and so on; 51 per cent. are earning their living in practical agricultural work; and 4 per cent. are working on their own account as smallholders, nurserymen and dairymen. The number known to have left the industry is less than 5 per cent. Of the remainder, 2 per cent. are women who have married, 3 per cent. are temporarily out of work, and track has been lost of 8 per cent. (movements from farm to farm accounting for

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loss of contact), most of whom, however are believed to be occupied in agricultural pursuits. Details are as follows:—

Administrative, teaching, research or advisory appointments of an agricultural nature either at home or abroad ..	115
Veterinary surgeons ..	3
Agricultural posts of a supervisory character (e.g., managers or foremen of farms, nurseries, dairies, etc.) ..	203
Working on own account (smallholders, nurserymen, dairy-men, etc.) ..	43
Engaged in practical agricultural occupations ..	599
Women who have married ..	28
Still seeking employment ..	33
Obtained employment outside the agricultural industry ..	53
Died ..	7
Cannot be traced; probably engaged in agricultural employment ..	86

1,170

(ii) **Young Farmers' Clubs.**—The Young Farmers' Club movement continued to make satisfactory progress under the guidance of the National Federation. The clubs are formed and conducted on well-defined lines with an adult advisory committee and an experienced club leader. The value of such clubs as a branch of rural education is becoming increasingly apparent, and is now widely recognized.

There can be no doubt that the National Federation, though hampered by lack of funds, and able to employ only a secretary with a small office staff and three travelling organizers, is of vital importance to the movement as a whole, and ought to be established on a permanently sound financial basis. Since the Ministry relinquished direct control, grants towards the maintenance of the headquarters organization have been made from Exchequer funds and from the Carnegie United Kingdom Trust, but this assistance has been regarded as temporary. Considerable attention has been given to the problem of securing sufficient capital to make the Federation independent, and a public appeal for funds for this purpose was launched early in the year. This appeal was the subject of a broadcast talk by the Parliamentary Secretary in the B.B.C.'s "The Week's Good Cause" series, and a reception arranged to draw attention to it was held at No. 10, Downing Street. The Minister supported the efforts that were being made in a speech at Sadler's Wells Theatre on the occasion of the production of a play by the Toc H Drama League. Nevertheless, it soon became evident that

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the object of the appeal could not be soon or easily achieved, and towards the end of 1933 the Ministry obtained Treasury sanction to the payment of grant at the rate of £1,200 per annum for a further period of two years. A promise of further assistance from the Carnegie United Kingdom Trust was also obtained.

(iii) Sugar-Beet.—The beet sugar factories again provided funds for a programme of education and research in sugar-beet cultivation under the control of a committee of representatives of the factories and of the Ministry. The education section of this programme consisted of a regional prize scheme and the arrangement of demonstrations.

The object of the prize scheme was to give the growers and their agricultural workers, to whom money prizes amounting in all to £1,250 were offered, an incentive to adopt the best practices and to avail themselves of the results of recent research work. It provided for the award of nine prizes to growers in each factory area, the competitors being divided into groups according to acreage and type of land. In addition to the money prizes the Ministry was presented by Mr. Alfred Wood with a Championship Cup to be awarded to the competitor who, in the opinion of the judges, grew or made the most praiseworthy effort to grow the best crop of the year. This Cup was awarded to Mr. T. A. Standley of Occold, Suffolk, who on 42 acres of heavy land grew a crop that gave an average yield of washed beet per acre of more than double the average for the whole country, and also a sugar content above the average for the whole country.

The agricultural organizers and factory agriculturists again collaborated in arranging demonstrations in the different factory areas. These demonstrations covered many aspects of the cultivation of sugar-beet and the use of factory by-products, e.g., seed varieties and seed treatment, effects of various artificial manures, rate and time of manuring, top-dressing, drilling, spacing, plant population, lifting, the use of factory lime sludge, and the value of beet tops and dried beet pulp as feeding-stuffs.

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACTS, 1934 AND 1935: NUMBER, WEIGHT AND PRICES OF CATTLE CERTIFIED FOR PAYMENTS

IN the issues of this JOURNAL for May and August, 1935, information was given regarding the cattle and carcasses of cattle certified for payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, during the first nine months of the Scheme. Similar information is now available for the three months June to August, 1935, and in this article the particulars for these months are set out on similar lines to those previously published.

As mentioned in the previous reports, the classes of cattle in respect of which payments are made are steers, heifers and cow-heifers—a cow-heifer being defined as an animal that has calved and has grown not more than six permanent incisor teeth. The standard required from September 1 to December 31, 1934, was that an animal should have an estimated killing-out percentage of not less than 52 per cent., and from January 1, 1935, a killing-out percentage of not less than 54 per cent.

The figures relating to cattle certified in the United Kingdom, as given in the earlier reports, have been slightly revised, and the following table (p. 794) shows the numbers of each class of cattle certified in the three months ended August 31, 1935, together with revised figures for the first nine months and totals for the first complete year of operation of the scheme.

The rate of marketing of fat cattle from month to month, as indicated by the above figures, must be judged with some reserve on account of the fact that the great majority of fat stock markets are held on the earlier days of the week. A useful comparison may, however, be drawn between the total numbers of animals certified in each of the four periods of three months, and the 1,528,760 animals marketed in the whole year were apportioned as follows:—

September to November, 1934	..	23.6	per cent.
December, 1934, to February, 1935	..	24.9	" "
March to May, 1935	.. ..	27.3	" "
June to August, 1935	.. ..	24.2	" "

Animals certified at Live-Weight Certification Centres accounted in the three months June to August, 1935, for

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	<i>Steers No.</i>	<i>Heifers No.</i>	<i>Cow-heifers No.</i>	<i>Total No.</i>
September, 1934 ..	62,104	49,534	3,792	115,430
October, 1934 ..	69,276	58,466	4,592	132,334
November, 1934 ..	58,411	50,749	4,131	113,291
TOTAL : September to November ..	189,791	158,749	12,515	361,055
December, 1934 ..	63,638	51,083	3,832	118,553
January, 1935 ..	82,094	51,862	4,953	138,909
February, 1935 ..	77,696	41,212	4,421	123,329
TOTAL : December to February ..	223,428	144,157	13,206	380,791
March, 1935 ..	86,708	39,599	4,616	130,923
April, 1935 ..	102,732	40,917	4,811	148,460
May, 1935 ..	96,633	36,823	4,655	138,111
TOTAL : March to May ..	286,073	117,339	14,082	417,494
June, 1935 ..	75,102	38,851	4,388	118,341
July, 1935 ..	70,703	55,602	4,934	131,239
August, 1935 ..	62,189	53,304	4,347	119,840
TOTAL : June to August ..	207,994	147,757	13,669	369,420
TOTAL for 12 months ..	907,286	568,002	53,472	1,528,760

359,958 of the total of 369,420 animals certified at both Live-Weight and Dead-Weight Centres, and details of the numbers of each class of animal certified at Live-Weight Centres in each of the agricultural divisions into which the country is divided are given in the table on page 799.

The numbers of animals certified at Live-Weight Certification Centres in England, Wales, Scotland, Northern Ireland and the United Kingdom respectively in each period of three months and also in the whole of the first year's operation of the Act, together with percentages for each country, are shown in the next table.

It will be seen that while the percentage of animals certified in England and Scotland showed comparatively little variation from quarter to quarter, the percentage in Wales fell from over 7 per cent. in the autumn and winter to 4 per cent. in the spring and summer. Northern Ireland certifications were smaller in the autumn than in the other three quarters of the year.

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NUMBER AND PERCENTAGE OF ANIMALS CERTIFIED IN EACH COUNTRY

Country	Sept.—Nov. 1934		Dec. 1934— Feb. 1935		March—May 1935		June—Aug. 1935		Year	
	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.
England	233,112	66.1	234,020	62.9	262,587	64.5	243,864	67.7	973,583	65.3
Wales	24,750	7.0	28,415	7.6	16,998	4.2	13,865	3.9	84,028	5.6
Scotland	74,670	21.1	82,145	22.1	95,167	23.4	74,576	20.7	326,558	21.9
Northern Ireland	20,438	5.8	27,382	7.4	32,315	7.9	27,653	7.7	107,788	7.2
TOTAL										
United Kingdom	352,970	100	371,962	100	407,067	100	359,958	100	1,491,957	100

The variations in the numbers of cattle certified in the different agricultural divisions at different seasons of the year is of interest. It will be seen from the next table that although there was relatively little variation over England as a whole, the north-eastern division (Norfolk, Lincolnshire and the East Riding of Yorkshire), and to a lesser degree the eastern division, marketed about one-third of the year's supply in the three spring months. The east-midland division, which includes the large feeding pastures of Leicestershire and Northamptonshire, marketed about one-third of the year's total in the autumn and only about one-sixth in the spring. In Wales two-thirds of the year's supply were placed upon the markets in the autumn and winter months, while in Scotland and Northern Ireland the largest proportion came forward in the spring.

The relative numbers of fat steers and heifers sold showed comparatively little variation from month to month from September to December, 1934, when heifers accounted for between 43 and 45 per cent. of the certified cattle and steers for between 51½ and 54 per cent. By the end of February, however, the proportion of heifers had decreased to 33½ per cent. and steers had increased to 63 per cent., and the proportion of heifers continued to decline until May, after which heifers accounted for an increased proportion of the total sales each month. By August, heifers had reached their highest percentage over the whole twelve months. The proportion of cow-heifers remained steady throughout the year at between 3 and 4 per cent. The following table shows

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STATEMENT SHOWING, FOR EACH AGRICULTURAL DIVISION, THE PERCENTAGE OF THE CATTLE CERTIFIED IN THE DIVISION, WHICH WERE MARKETED DURING EACH QUARTER OF THE YEAR.

	Sept.—Nov. 1934	Dec. 1934— Feb. 1935	Mar.—May 1935	June—Aug. 1935
ENGLAND	Per cent.	Per cent.	Per cent.	Per cent.
East	19'1	22'4	30'8	27'7
North East ...	15'3	20'4	39'0	25'3
South East ...	23'5	26'5	26'0	24'0
East Midland ...	32'2	23'9	17'2	26'7
West Midland ...	22'0	28'0	27'6	22'4
South West ...	23'7	26'8	25'0	24'5
North	25'9	23'4	25'6	25'1
North West ...	28'7	24'6	22'4	24'3
All England ...	23'9	24'0	27'0	25'1
WALES				
North	30'0	35'6	19'0	15'4
South	29'0	32'4	21'2	17'4
All Wales ...	29'4	33'8	20'3	16'5
SCOTLAND				
North East ...	22'5	26'4	30'5	20'6
East Central ...	18'4	21'5	34'1	26'0
South East ...	24'0	25'7	26'5	23'8
West & S.-West	28'4	27'4	23'0	21'2
North & N.-West	21'7	25'8	29'2	23'3
All Scotland ...	22'9	25'1	29'1	22'9
NORTHERN IRELAND	19'0	25'4	30'0	25'6

the percentages of each class of cattle certified in the three months June to August:—

	<i>Steers</i> Per cent.	<i>Heifers</i> Per cent.	<i>Cow-heifers</i> Per cent.
June, 1935	63'3	33'0	3'7
July, 1935	53'6	42'7	3'7
August, 1935	51'5	44'9	3'6

The larger proportion of the animals certified throughout the whole year in the eastern, north-eastern and east-midland divisions of England, in all parts of Scotland and in Northern Ireland, were steers. The west-midland and

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south-western divisions of England marketed heifers in greater proportion in all seasons except the spring, while heifers predominated all the year round in the north-western division, though to a lesser extent in the spring. In the northern division more steers than heifers were fattened in the winter and spring, and more heifers than steers in the grass season.

The number of animals certified at Dead-Weight Centres in the first nine months of the scheme was 27,341, of which 22,955 were certified in England and Wales and 4,386 in Scotland. The numbers certified in the three months June to August were as follows:—

	<i>England and Wales</i>	<i>Scotland</i>	<i>Great Britain</i>
	<i>No.</i>	<i>No.</i>	<i>No.</i>
June, 1935 . . .	2,638	303	2,941
July, 1935	2,578	455	3,033
August, 1935	2,801	687	3,488
Total for 3 months	8,017	1,445	9,462
Total for 12 months .	30,972	5,831	36,803

Average Weight of Fat Cattle.—The average live weight at which fat cattle were marketed over the three months June to August was 9 cwt. 1 qr. 14 lb., and over the whole twelve months 9 cwt. 2 qr. 1 lb. In June, 1935, the average was 9 cwt. 1 qr. 14 lb., in July 9 cwt. 1 qr. 10 lb., and in August 9 cwt. 1 qr. 17 lb. The following are the details of the average weights in each country:—

	<i>Average weight over three months June to August, 1935 cwt. qr. lb.</i>	<i>Average weight over twelve months September 1934, to August, 1935. cwt. qr. lb.</i>
England and Wales	9 1 10	9 2 2
Scotland ..	9 3 14	9 3 8
Northern Ireland	8 1 3	8 1 23
United Kingdom	9 1 14	9 2 1

The dressed carcass weights of the animals certified at Dead-Weight Centres averaged 626 lb. over the three months June to August, 1935, and 614 lb. over the whole twelve months, details being as follows:—

	<i>Average weight over three months June to August, 1935. lb.</i>	<i>Average weight over twelve months September 1934, to August, 1935. lb.</i>
England and Wales	626	612
Scotland	628	623
Great Britain	626	614

Average Prices of Fat Cattle.—The prices of fat cattle, which were declining in January and February, 1935, con-

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tinued to fall until the end of March, then rose steadily until June, when the price reached the highest of any month since September, 1934. The average price declined slightly in July, but a sharp decrease occurred in August. Average prices per live cwt. for the three months June to August and for the whole year were as follows:—

	<i>England and Wales</i>	<i>Scotland</i>	<i>Northern Ireland</i>	<i>United Kingdom</i>
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
June, 1935	36 7	38 11	32 4	36 10
July, 1935	35 10	40 2	31 11	36 6
August, 1935	33 11	37 7	31 0	34 6
Average for three months (June to August, 1935)	35 5	38 11	31 9	35 11
Average for twelve months (September, 1934, to August, 1935)	34 10	38 3	31 0	35 5

The average price per cwt. dressed carcass weight of the cattle certified on a dead-weight basis over the three months June to August, 1935, was 62s. 8d., and over the whole twelve months 61s. 11d. Average prices per cwt. dressed carcass weight were as follows:—

	<i>s. d.</i>
June, 1935	62 3
July, 1935	63 9
August, 1935	62 0
Average for three months (June to August, 1935)	62 8
Average for twelve months (Sep- tember, 1934, to August, 1935)	61 11

For the reason mentioned in the previous reports (i.e., the lapse of time between the sale of a carcass and the date of receipt of the certificate by the Cattle Committee) the movements in prices of cattle certified on a dead-weight basis are not reflected as quickly as the movements in the prices of live animals.

The Agricultural Divisions comprise the Counties of:—

ENGLAND—

EAST: Bedford, Huntingdon, Cambridge, Suffolk, Essex, Hertford, Middlesex and London.

NORTH-EAST: Norfolk, Lincoln and York, East Riding.

SOUTH-EAST: Kent, Surrey, Sussex, Berkshire and Hampshire.

EAST MIDLAND: Nottingham, Leicester, Rutland, Northampton, Buckingham, Oxford and Warwick.

WEST MIDLAND: Salop, Worcester, Gloucester, Wiltshire and Hereford.

VISIONS) ACTS

Details of the monthly figures from September, 1934, to February, 1935, are given on pages 144 and 145 of this JOURNAL, for May, 1935, and from March, 1935, to May, 1935, on page 467 of this JOURNAL, for August, 1935.

CATTLE INDUSTRY (EMERGENCY PROVISIONS) ACTS

ENGLAND (*continued*)—

SOUTH-WEST: Somerset, Dorset, Devon and Cornwall.

NORTH: Northumberland, Durham and York, North and West Ridings.

NORTH-WEST: Cumberland, Westmorland, Lancaster, Chester, Derby and Stafford.

WALES—

NORTH: Anglesey, Caernarvon, Merioneth, Montgomery, Denbigh and Flint.

SOUTH: Cardigan, Radnor, Brecon, Monmouth, Glamorgan, Carmarthen and Pembroke.

SCOTLAND—

NORTH-EAST: Nairn, Moray, Banff, Aberdeen and Kincardine.

EAST CENTRAL: Angus, Perth, Fife, Clackmannan and Kinross.

SOUTH-EAST: West Lothian, Midlothian, East Lothian, Berwick, Roxburgh, Selkirk and Peebles.

WEST AND SOUTH-WEST: Argyll, Bute, Dumbarton, Stirling, Lanark, Renfrew, Ayr, Dumfries, Kirkcudbright and Wigtown.

NORTH AND NORTH-WEST: Zetland, Orkney, Caithness, Sutherland, Ross and Cromarty, and Inverness.

MARKETING NOTES

Milk Marketing Scheme: Pool Prices for September, 1935.—The wholesale contract price for September, 1935, was 1s. 4d. per gal. in all regions, 3d. per gal. more than in August. Pool prices and rates of producer-retailers' contributions for the month are given below, with comparative figures for August and also for September, 1934, when the wholesale price was 1s. 1d. per gal. in the south-eastern region and 1s. per gal. in all other regions:—

Region	Pool Prices (<i>d.</i> per gal.)			Producer-Retailers' Contributions (<i>d.</i> per gal.)		
	Sept. 1935	August 1935	Sept. 1934	Sept 1935	August 1935	Sept. 1934
Northern ..	12½	10	10½	2½	2½	1½
North-Western ..	12½	10	10½	2½	2½	1½
Eastern ..	13	10½	11	2½	2½	1
East Midland ..	13	10	10½	2½	2½	1½
West Midland ..	12½	9½	10½	3½	2½	1½
North Wales ..	12½	10	10½	3½	2½	1½
South Wales ..	12½	10½	11	2½	2½	1
Southern ..	13	10½	11	2½	2½	1
Mid-Western ..	12½	9½	10½	3½	2½	1½
Far-Western ..	12½	9½	10½	3½	2½	1½
South-Eastern ..	13½	10½	11½	2½	2½	1½
Unweighted Average	12·73	10·05	10·82	2·89	2·53	1·20

Producer-retailers who qualified were credited with level delivery premiums at the rate of ½d. per gal. Accredited producers numbering 9,936 received a premium of 1d. per gal. in addition to the pool price. A levy of ¼d. per gal. was made for general expenses.

Sales on wholesale contracts were as follows:—

	September, 1935. (estimated) gal.	September 1934. gal.
Liquid	46,008,741	43,981,449
Manufacturing . . .	20,050,912	15,705,176
	66,059,653	59,686,625
Percentage Liquid Sales ..	69·6	73·7
„ Manufacturing Sales	30·4	26·3

The average realization price of manufacturing milk

MARKETING NOTES

during September was 5.54*d.* per gal., compared with 5.73*d.* per gal. for August. Milk manufactured into cheese by farmhouse cheesemakers amounted to 1,559,854 gal., compared with 1,843,149 gal. in August, and 2,773,752 gal. in September, 1934.

Complaints by the Central Milk Distributive Committee and the Parliamentary Committee of the Co-operative Congress.—The Committee of Investigation for England held meetings on October 7-10 inclusive to consider the complaint of the Central Milk Distributive Committee regarding the prices and certain of the terms of the contract prescribed by the Milk Marketing Board for the twelve months from October 1, 1935. The Committee decided to hear concurrently a similar complaint made by the Parliamentary Committee of the Co-operative Congress on behalf of the Co-operative Movement.

After opening his case, Counsel for the Central Milk Distributive Committee intimated that he was not in a position to proceed with the submission of evidence, and he applied for an adjournment of five weeks in order that the necessary evidence might be prepared. The Committee accordingly adjourned until November 11.

Pigs and Bacon Marketing Schemes. --*Pig Contract Terms for 1936.*—The terms of the 1936 bacon-pig contract, which have now been agreed between the Pigs and Bacon Marketing Boards, show a number of important points of difference from the 1935 contract.

(a) *Price.*—Pig prices will continue to be fixed on the "co-partnership" principle; a new formula, however, has been adopted, and this, it is claimed, should result in an increase of from 2*d.* to 4*d.* per score. The starting point of the new formula is that with bacon at 96*s.* and feeding-stuffs at 7*s.* 6*d.* per cwt. the basic pig price will be 11*s.* 7*d.* per score. For each rise or fall of 1*s.* 2*d.* per cwt. in bacon prices above or below 96*s.*, 1*d.* per score will be added to or deducted from the pig price so long as the bacon price is not more than 98*s.* 4*d.* and not less than 90*s.* 2*d.* For every 10*d.* rise in bacon prices above 98*s.* 4*d.* a further 1*d.* per score will be added, and for every 10*d.* fall below 90*s.* 2*d.* a further 1*d.* per score will be deducted from the pig price. This will have the effect of sharing bacon price movements equally between producers and curers as long as bacon prices are within the range of 90*s.* 2*d.* to 98*s.* 4*d.*, and of giving the producer approximately 75 per cent. of any additional "loss" or "profit" when bacon prices are outside that range.

Pig prices will also be varied in accordance with movements in the agreed ration of feeding-stuffs, additions or deductions of 1½*d.* per

MARKETING NOTES

score being made for rises and falls of 3d. per cwt. in the price of feeding-stuffs above or below the basic figure of 7s. 6d. If, however, bacon prices are outside the range of 90s. 2d. to 98s. 4d., the addition or deduction in respect of variations of 3d. in the prices of feeding-stuffs will be only 1d. per score.

Over and above the prices so calculated, a special addition of 1d. per score will be made to the pig price when bacon is between 88s. 6d. and 97s. 2d.

Allowance will also be made for variations in the value of offals, any rise or fall in the total value of offals from a 7-score pig being added to or deducted from the ascertained bacon price for the purpose of arriving at the price to be paid for pigs.

The price difference of 3d. per score between Classes I and II pigs remains unchanged, but Class III pigs will, in future, be paid for at the same price as Class II. The basic price of Class IV pigs will be 9d. per score instead of 1s. per score less than that of Class I.

(b) *Grading*—Certain modifications in grading are to be introduced. In Classes I and II grade measurements will remain unchanged, but a pig with an "A" shoulder and a "D" belly will be paid for as "C" grade, while a pig with an "A" shoulder and a "C" belly, provided it is 150 lb. or over, will receive a bonus of 3d. per score. The maximum shoulder measurements for the grade "C" pig in Class III will be increased by $\frac{1}{8}$ inch.

(c) *Group Contract Pigs*.—The present system of group contracts will be discontinued. Producers will have the option of making a direct contract with a curer or a contract with the Board. Contracts with the Board will subsequently be allocated to curers by the Board, and the pig producer will then receive an additional payment of 2s. per pig for all pigs delivered and accepted by the curer.

(d) *Railway Flat Rate*.—The Railway Flat Rate will be increased from 1s. 6d. to 1s. 8d. station to station and from 2s. 1d. to 2s. 3d. for pigs collected and delivered by road. Concessions will, however, be made by the Railway Companies in the scale of cartage rebates applicable where pigs are conveyed by road in producers' or curers' vehicles. In addition to favourable alterations in the schedule of distances, there will be increases in the scale of rebates of from 2d. to 4d. per pig.

(e) *Insurance*.—The contract will provide for the compulsory deduction of 6d. per pig to cover the pig producer's risk of loss through damage in transit, or disease which was not apparent when the pig left the farm.

(f) *Level Delivery*.—As in 1935, the contract will provide for a minimum percentage of pigs to be delivered in the first four months of the year, and a bonus will be paid to pig producers who deliver in those months certain minimum proportions of the total number of pigs covered by the contract. A payment of 2d. per score on all contract pigs delivered and accepted throughout the year will again be made by curers, in order to provide a fund for this purpose.

(g) *Other Provisions*.—There will be some improvement in the prices payable for pigs weighing under 7 score tendered as contract deliveries and accepted by the curer. In addition, changes in the allowances for shrinkage from hot to cold weight have been made in favour of the pig producer.

The contract, as a whole, means that the pig producer will be in a considerably improved position as compared with 1935.

MARKETING NOTES

Pig Prices for October.—There was a further and more marked decline in the contract price for pigs in October, the price for the basic pig, (i.e., Class I, Grade C) being 10s. 2d. per score compared with 11s. for September. The decline was mainly due to the fall in the ascertained bacon price from 88s. 9d. to 82s. 2d. per cwt.; the variation in the cost of the feeding stuffs ration was again only slight. The basic price is exclusive of the curers' contribution of 1d. per score towards insurance and 2d. per score towards level delivery bonuses on pigs delivered during the first four months of the year.

Potato Marketing Scheme.—*Election of District Members.*—Meetings for the election of district members were held on October 19 in the following five districts: No. 1 (South-Western), No. 2 (South-Eastern), No. 3 (Eastern), No. 4 (Lincoln) and No. 5 (East Midland). In the South-Western district the retiring member was defeated. In the South-Eastern district, one of the retiring members was returned, and the other, who did not seek re-election, was replaced. In the three other districts, the retiring members were returned unopposed.

Report on the Operation of the Potato Marketing Scheme.—The annual report of the Potato Marketing Board, covering the year ended August 31 last, presents an interesting summary of the Board's activities during that year.

The first half of the report deals with the regulation of supplies through riddle regulations and with the complementary control of imports. It is claimed that the Board's policy has resulted, in a difficult season, in an additional return to producers of £7 18s. 0d. per acre compared with the 1933-34 season.

The Board are also carrying out important work in the co-ordination and improvement of marketing practices. This they seek to accomplish through the system of authorized merchants. During the year, some 6,000 applications for authorization have been examined, of which 3,700 have been granted. As previously mentioned in this JOURNAL, the Board have promoted a scheme of regulation of distributors' margins by voluntary agreement among authorized merchants. This scheme has recently come into

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operation in many of the main consuming centres, and its progress will be watched with interest.

The initiative of the Board in endeavouring to develop new outlets for potatoes has been shown in many ways. The Report describes the publicity that has been carried out, and gives an account of the arrangements that have been made with a company for the manufacture of cattle food from surplus potatoes. It also refers briefly to the Board's experiment in the sale of cheap potatoes to the unemployed, a special report* on which was reviewed on pp. 695-698 of the October issue of this JOURNAL.

New Conditions for the Authorization of Merchants.—The Potato Board have issued revised conditions for the authorization of merchants in connexion with the working of the Market Plans described in this JOURNAL for October. The Board now take powers, among others, to inspect the accounts and records of the authorized merchants, and to secure adherence of all authorized merchants to the arrangements for the fixing of distributive margins, which are being introduced in the main consuming areas.

Bacon Import Regulation.—The provisional foreign bacon allocations for the three months, July to September, 1935, detailed in the July issue of this JOURNAL (p. 379) were duly confirmed. It was there stated that home and Dominion supplies in the last quarter of 1935 were likely to be at a higher rate than in the third quarter, and that this would involve a corresponding reduction of the foreign allocations for the last quarter. Following a further review of the position, the total foreign bacon allocation for the three months, October to December, 1935, has been reduced by the maximum amount consistent with the undertaking given to the countries concerned in October, 1934, viz., $12\frac{1}{2}$ per cent. on the rate of importation in the last five months of 1934. This is equivalent to a reduction of about 10 per cent. on the rate of allocation for the first six months of 1935, and of nearly 13 per cent. on that for the three months, July to September, 1935. The allocations to individual foreign countries for the three months, October to December, 1935, are as follows:—

* An Experiment in the Distribution of Potatoes at Bishop Auckland.

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	<i>Cwt.</i>
Denmark	841,437
Netherlands	119,186
Poland	99,740
Sweden	58,966
Lithuania	37,011
Estonia	9,979
Finland	5,322
Latvia	9,314
U.S.S.R.	11,311
Argentina	9,314
U.S.A.	100,367
Other Countries	30,353
Total	1,332,300

Milk Act, 1934.—Advances amounting to £1,389,695 have to date been made to the Milk Marketing Board under Section 1 of this Act in respect of milk used for manufacture to August last (excluding milk manufactured by the Board itself or milk used for cheese-making on farms). Particulars are given below:—

Period	Gallons	^a Rate of payment per gallon	Advances £
April to Sept. 1934 ...	79,294,584	Varying from 0·5 to 1·5 pence	426,160
Oct. 1934 to Mar. 1935	73,568,344	Varying from 1·0 to 2·28 pence	571,590
April to August 1935...	106,495,865	Varying from 0·5 to 1·21 pence	391,945
TOTAL	259,358,793	—	£1,389,695

* Varies according to month and product.

Under Section 6 of the Act, a sum of £236,745 has, by direction of the Treasury, been paid to date by the Ministry to the Government of Northern Ireland with the object of securing a standard price for milk manufactured into cream and butter at registered premises in Northern Ireland to July last. This sum is made up as follows:—

Period	Gallons	^a Rate of payment per gallon	Amount of Equalization Payment £
April to Sept. 1934 ...	12,150,317	Varying from 1·5 to 2·2 pence	101,353
Oct. 1934 to Mar. 1935	6,049,718	Varying from 1·88 to 2·99 pence	62,077
April to July 1935 ...	10,118,249	Varying from 1·32 to 1·89 pence	73,315
TOTAL	28,318,284	—	£236,745

* Varies according to month.

MARKETING NOTES

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4·36 pence per pound for the month of October.

Milk-in-Schools Scheme.—Payments amounting to £375,028 have been made to date to the Milk Marketing Board under Section 11 of the Milk Act by way of compensation in respect of the Board's expenses in supplying milk to school children at reduced rates. Details are given below : —

Month	Gallons	Exchequer Payment
1934		
October	1,969,912	£ 41,028
November	2,445,891	50,947
December	1,768,707	40,531
1935		
January	2,170,024	49,725
February	2,342,694	53,676
March	2,383,305	49,632
April	1,644,582	34,216
May	2,234,917	27,770
June	1,555,080	16,477
July	1,516,291	11,056
TOTAL	20,031,403	£375,028

Exchequer contributions amount to one-half of the Board's expenses in supplying the first 18,000,000 gal., and one-quarter of the expenses in respect of milk supplied in excess of that quantity before September 30, 1935. The Board's expenses are equivalent to the wholesale price of milk for the month concerned, together with the cost of distribution (6d. per gal.), less the payments by children at the rate of 1s. per gal.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1931 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted, by October 10, to

MARKETING NOTES

£3,984,875. These payments were in respect of 1,675,141 animals, the average payment per beast being £2 7s. 7d. Since August 6, 1934, some 458,000 animals have been marked at ports (excluding Northern Ireland) under the Marking of Imported Cattle Order.

Wheat Act, 1932: Sales of Home-grown Wheat—Cereal Year 1935-36.—Certificates lodged with the Wheat Commission by registered growers during the period August 1 to October 4, 1935, cover sales of 5,979,258 cwt. of millable wheat as compared with 5,387,213 cwt. in the corresponding period (to October 5) in the last cereal year.

New Quota Payments Order and Anticipated Supply for Cereal Year, 1935-36.—Orders made by the Minister on the recommendation of the Wheat Commission reduce the amount of the quota payment that every miller and every importer of flour is liable to make in respect of each hundredweight of his output of flour and give estimates upon which the new rate of quota payment is based. The Wheat (Anticipated Supply) No. 2 Order, 1935, estimates the quantity of home-grown millable wheat of their own growing that will be sold by registered growers during the 1935-36 cereal year at 29,200,000 cwt. The Wheat (Quota Payments) No. 2 Order, 1935, estimates that the average price obtainable by registered growers throughout the United Kingdom for home-grown millable wheat sold and to be sold by them in the 1935-36 cereal year will be 5s. 1d. per cwt. at farm and that the price deficit per cwt. of such wheat will be 4s. 11d. The supply of flour for the cereal year is estimated at 83 million cwt. It is accordingly ordered that the quota payment that every miller and every importer of flour shall be liable to make to the Wheat Commission in respect of each hundredweight of his deliveries of flour during the period commencing September 29, 1935, shall be 19·2 pence (equivalent to 4s. 0d. per sack of 280 lb.).

Copies of the Orders—Statutory Rules and Orders, 1935, Nos. 950 and 951—can be obtained from H.M. Stationery Office or through any booksellers, price 1d. each, post free 1½d.

Appointment of Member of Wheat Commission.—Alder-
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man Solomon Stephens, J.P., of Plymouth, has been appointed as the representative of bakers of bread to fill the vacancy on the Commission caused by the resignation of Mr. F. Nevill Jennings.

Sugar-Beet.—*Appointment of Sugar Tribunal.*—Following upon the decision of the Government, announced in the Statement of Sugar Policy (Cmd. 4964) presented to Parliament in July last, to set up a temporary Sugar Tribunal, the Chancellor of the Exchequer and the Minister of Agriculture and Fisheries have appointed the following persons to act in that capacity:—

Lt -Col. Sir Francis Henry Humphrys, G.C.M.G., G.C.V.O., K.B.E.,
C.I.E.,
Sir Thomas D. Barlow, K.B.E., and
William E. Mortimer, Esq.

The purpose of the Tribunal is to examine and advise upon any scheme for amalgamating the companies at present engaged in the production of sugar from home-grown beet which the Beet Sugar Factories Committee may submit for the Government's approval.

Sir Francis Humphrys is the Chairman. The Secretary is Dr. C. Burgess, to whom all communications should be addressed at the offices of the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

1935-36 *Campaign.*—The manufacturing season opened somewhat later than usual because of the backwardness of the beet crop owing to adverse weather conditions in the early part of the year. Preliminary returns of field sampling data indicate an average yield and sugar content.

Production of Home-grown Beet Sugar during 1935-36 Campaign.—According to returns made to the Ministry by the beet sugar factories operating in Great Britain, the total quantities of beet sugar manufactured during September, 1935, and the corresponding month in 1934 were:—

			<i>White. cwt.</i>	<i>Raw. cwt.</i>	<i>Total. cwt.</i>
1935	..	.	79,468	50,048	129,516
1934	..	..	181,647	365,203	546,850

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef

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graded and marked with the National Mark during July, August and September, 1934 and 1935, and the three weeks ended October 19, 1935, were as follows:—

LONDON AREA.

	<i>Home-killed.</i>	<i>Scotch sides for London.</i>	<i>Total.</i>
July, 1934 .. .	6,850	5,313	12,163
„ 1935 .. .	11,136	7,538	18,674
August, 1934 .. .	7,135	5,401	12,536
„ 1935 .. .	10,138	6,927	17,065
September, 1934 .. .	6,710	5,884	12,594
„ 1935 .. .	11,792	7,492	19,284
Three weeks ended October 19, 1935 .. .	8,383	5,130	13,513

BIRKENHEAD AREA.

(Including Liverpool.)

	<i>For London (Included under Home-killed in London Area).</i>	<i>Liverpool (For local requirements).</i>	<i>Total</i>
July, 1934 .. .	1,194	1,304	2,498
„ 1935 .. .	2,100	1,701	3,801
August, 1934 .. .	1,661	1,294	2,955
„ 1935 .. .	1,749	1,517	3,266
September, 1934 .. .	1,954	1,250	3,204
„ 1935 .. .	2,743	1,760	4,503
Three weeks ended October 19, 1935 .. .	2,178	1,150	3,328

BIRMINGHAM AND YORKSHIRE AREAS.

	<i>Birmingham.</i>	<i>Leeds.</i>	<i>Bradford.</i>	<i>Halifax.</i>
July, 1934 .. .	3,775	1,937	1,521	443
„ 1935 .. .	4,398	2,722	1,592	515
August, 1934 .. .	4,015	1,810	1,282	362
„ 1935 .. .	4,145	2,412	1,195	400
September, 1934 .. .	4,059	1,864	1,432	416
„ 1935 .. .	4,925	2,815	1,751	570
Three weeks ended October 19, 1935 .. .	3,696	1,889	1,185	386

The number of sides graded and marked during July, August and September, 1935, shows an appreciable increase over the corresponding period in 1934, the figures being 87,441 sides and 64,057 sides respectively.

Fat Stock : Carcass Sales by Grade and Dead Weight.—The facilities of the grade and dead-weight scheme have now been placed at the disposal of producers who, instead of obtaining at the wholesale meat markets competitive quotations under the scheme, prefer to maintain their personal relationships with particular wholesalers

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by arranging the price under private contracts. This concession has been made in response to requests from producers and wholesalers who wish to agree mutually upon the price for the various grades and secure the benefits of the scheme in the matter of grading, weighing, insurance, conditions of sale, etc.

During the three months ended September 30, quotations were issued by the Ministry's graders for over 1,000 separate offers of stock; and increasing numbers of producers are now regularly sending consignments to the grading centres for disposal under the scheme.

Producers generally are becoming more familiar with the scheme and its quality requirements. As indicated by the following figures, the percentage of rejects has steadily diminished, and it is evident from the low proportion of rejects this year that senders under the scheme are now well acquainted with the types of animals falling within the dead-weight grades. The advantages to the producers of selling, by grade and dead weight, well-finished animals of the right type cannot be over-emphasized.

	<i>Total No. of animals dealt with.</i>	<i>No. of rejects</i>	<i>Percentage of rejects.</i>
CATTLE.			
1930	140	5	3.5
1931	410	21	5.1
1932	1,017	50	4.9
1933	2,448	85	3.5
1934	5,542	239	4.3
1935 (9 months)	7,981	156	2.0

	<i>Total No. of animals dealt with.</i>	<i>No. of rejects</i>	<i>Percentage of rejects.</i>
SHEEP.			
1933	16,968	1,644	9.7
1934	21,108	1,076	5.1
1935 (9 months)	18,808	470	2.5

	<i>Total No. of animals dealt with.</i>	<i>No. of rejects</i>	<i>Percentage of rejects.</i>
PIGS.			
1933	26	2	7.7
1934	1,489	17	1.1
1935 (9 months)	3,320	45	1.3

The increase in the numbers of all classes of fat stock dealt with in the three months to September 30, 1935, as compared with the same period of 1934, is shown in the figures given below:—

	<i>Cattle.</i>	<i>Sheep.</i>	<i>Pigs.</i>
3 months to Sept. 30, 1935	2,456	14,133	1,310
„ „ „ Sept. 30 1934	1,059	8,534	164

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The animals sold under the scheme to date have realized over £430,000: they comprise 17,538 cattle, 56,884 sheep and lambs, and 4,835 pigs.

National Mark Apples.—With the issue of the new Statutory Rule and Order, 1935, No. 976, containing revised definitions of grades of home-grown apples, the revised National Mark Scheme, referred to in the September issue of this JOURNAL, comes into operation. Particulars are given in Marketing Leaflet No. 59, copies of which may be obtained gratis, and post free, from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

National Mark Cheshire Cheese Scheme.—Particulars as to farm and creamery-made Cheshire cheese graded under the National Mark Scheme for the quarter ended September 30, 1935, are as follows:—

	<i>Farm-made Cheese.</i>	<i>Creamery-made Cheese.</i>
No. of makers offering cheese for grading	120	11
Total No. of cheese submitted for grading	27,754	25,553
Graded "Extra Selected"	29	1,914
Graded "Selected"	26,862	23,015
Rejected	863	624

National Mark Caerphilly Cheese Scheme.—The arrangements for the introduction of the National Mark Caerphilly Cheese Scheme are now complete, the Agricultural Produce (Grading and Marking) (Caerphilly Cheese) Regulations, 1935, having been promulgated on September 4, 1935. One maker has already been authorized in the scheme and a number of other applications are under consideration.

National Mark Flour at the Bakers' and Confectioners' Exhibition, 1935.—In the British Wheat Flour Competition held at this Exhibition, the class for All-English (Yeoman) Wheat Flour milled to National Mark standards attracted 13 entries from authorized miller-packers in the National Mark Scheme. The number of entries compared favourably with the number in the other wheat flour competitions. The gold, silver and bronze medals and diplomas

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offered by the Ministry to the winning entrants were awarded by the judges as under:—

- Gold Medal and Diploma—Hipwell & Sons, Sharnbrook, Beds.
Silver Medal and Diploma—G. Garratt & Sons, Sele Roller Mills, Hertford.
Bronze Medal and Diploma—Whitworth Bros., Ltd., Victoria Mills, Wellingborough.

The gold medal offered by the Ministry to the farmer supplying the largest proportion of wheat used in the winning flour was gained by Isaac Godber & Son, The Lodge Farm, Harrold, Bedfordshire.

The National Farmers' Union offered prizes in Class 61 for the best 1-lb. All-English milk loaf (tin) made from National Mark flour. Twenty-nine loaves, entered by 13 firms, were submitted, and the 1st, 2nd and 3rd prizes were awarded to:—

- W. Newman, High Street, Brill, Bucks.
W. G. Budd, Eaton Socon, St. Neots, Hunts.
J. W. Skinner, Bridens Bakery, Hertford

The judges expressed the opinion that the bread was more satisfactory than in any previous similar competition.

Improved Marketing of Turkeys, Christmas, 1935.—

The satisfactory results of the special arrangements made during the last two years for the grading and marking with the National Mark of home-produced turkeys for the Christmas trade have prompted the National Mark Egg and Poultry Trade Committee to recommend the continuance of the scheme for the forthcoming Christmas season. All authorized packers in the National Mark Dressed Poultry Scheme have been invited to co-operate by undertaking on an agreed service-charge basis:—

- (a) to collect, kill, grade, mark, pack and consign turkeys; or
- (b) to grade and mark turkeys on producers' premises at agreed rates varying in accordance with the number of birds submitted for grading.

In addition, the scheme provides for the temporary authorization, subject to safeguards to ensure a national standard of grading, of producer-dealers, and dealers or other producers, with an output of at least 500 turkeys, to apply the National Mark to dressed turkeys during the month of December, 1935. Other producers may either have their turkeys graded on the farm, or may send them to an authorized grading centre for this purpose.

MARKETING NOTES

Produce-dealers, dealers or other producers desiring to participate, either by becoming temporarily authorized as packers in the National Mark Dressed Poultry Scheme, or by having their turkeys graded on their farms or at an authorized packing station, should apply at once to the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1, for full particulars of the scheme.

Lord Mayor's Show, 1935.—Agriculture will take a prominent place this year in the Lord Mayor's procession, of which a large section will consist of items illustrating different phases of agricultural production and country life. Associations representative of the various sections of the industry are sending cars illustrative of their special interests. The Ministry of Agriculture and Fisheries will contribute a National Mark tableau designed to call attention to the advantages of marketing standardized agricultural produce.

Canada: Marketing Schemes.—Further schemes approved recently under the Natural Products Marketing Act, 1934, are concerned with sheep and lambs (British Columbia), and apples (Nova Scotia).

The British Columbia Sheep Breeders' Marketing Scheme, which became effective on August 12, 1935, regulates the marketing in inter-provincial and export trade of sheep and lambs (including carcasses, wool and hides) produced in a described area of British Columbia, which includes all but the extreme north of the province. The scheme is designed to supplement a similar scheme under British Columbia legislation, regulating such trade within the province. A local board of three persons is constituted, and is given general powers under the Canadian Natural Products Marketing Act to regulate marketing and to impose marketing levies. Sales of stock for breeding are excluded from the scope of the scheme.

Apple Marketing Scheme (Nova Scotia).—This scheme, which became effective on August 15, 1935, regulates the marketing of all apples grown in five adjoining counties of the Province of Nova Scotia. A grower's production of apples is excluded from the scope of the scheme if the whole of it is delivered to a shipper—a shipper being defined as a person who markets the regulated product. Provision is made for the registration of growers and the licensing of shippers. The local board to administer the scheme is to consist of five members elected annually, three by the votes of registered growers, one of whom is to be chairman, and two by licensed shippers. A provisional board is constituted to administer the scheme until June 30, 1936. To be eligible to vote growers must have produced at least 200 standard barrels of apples in any one of the three years preceding each election. Before July 10, 1936, a poll of registered growers is to be taken, to determine their wishes as to the continuation or termination of the scheme and as to any additions or amendments thereto. The local board is given wide powers of control over the marketing of the regulated product, including power to impose a marketing levy not exceeding two cents per barrel. Orderly marketing, through the channel of a marketing agency of three persons, and the prohibition of sales in Canada on consignment, are

MARKETING NOTES

contemplated, while efforts are to be made to increase consumption in domestic markets. The Board may require returns and information relating to the production and marketing of the regulated product from all persons engaged therein and may inspect their lands and premises.

France: Improvement of the Meat Market.*—By a law passed on August 16, 1935, the French Minister of Agriculture was authorized to utilize credits for the purpose of slaughtering and destroying cattle, the elimination of which was judged desirable on account of their bad general condition. The object of the measure was to improve the quality of the herds, to eliminate beasts that might be dangerous to the consumer, and to assist in raising the price of cattle by avoiding the competition of bad quality animals with good quality animals. The necessary instructions have now been issued for the carrying out of this programme of elimination. Purchasing Commissions have been set up in each Department of the country, and a credit of forty-five million francs (£600,000) has been appropriated for the purchase of defective beasts.

The cattle submitted to the Purchasing Commission will be paid for up to the limit of a maximum price, and after agreement between the owner and the Commission. The seller receives cash immediately for the animal so purchased by means of a payment voucher, which can be cashed on presentation at the local Tax Office, provided that it bears a certificate to the effect that the slaughter of the beast in question has been effected.

* Note by the Market Supply Committee.

NOVEMBER ON THE FARM

E. J. ROBERTS, M.A., M.Sc.,
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THE first autumn frosts are usually experienced in this district in the first week of November. Thus, taking the minimum temperature at grass level at a near-by weather station, frost has been registered before the seventh of the month on each of the last nine years, and in no year were there fewer than two nights of frost before the middle of the month. Frost sometimes arrives before the mangold crop has been carted, though it is only where this closely follows a period of continuous rain that a grower is caught with much of the crop still unclamped; there is something analogous in the positions of a grower who is prevented from harvesting his mangold crop by prolonged wet weather, and feels that the rain is almost certain to be followed by sharp frost, and that of a farmer who is unable, because of a high wind, to carry a crop of meadow hay, and is fairly certain that, when the wind subsides, rain will fall.

An unusual point of view regarding unfavourable weather conditions was expressed last summer by the manager of a large market garden in Essex. On my sympathizing with him because of the dry conditions under which so much transplanting had to be carried out, he remarked that he did not, on the whole, object to unsuitable weather, because such weather only hit severely the inefficient producer, and helped to eliminate him. In the case of transplanting, for example, those who had the knowledge and experience necessary for growing sturdy plants and for putting them in properly, into suitably tilled land, had not much to fear from the drought. This view may be correct in many instances, but there are some forms of bad weather, such as those causing floods, which are equally disastrous to the efficient and the inefficient.

Mangolds.—The dry conditions of the past summer have been more favourable to this crop than to the swede crop, since it is sown earlier, and has a stronger rooting system. A good example of the powerful rooting system and water-searching capacity of this crop was provided on a farm in

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Cambridgeshire in the course of cleaning out a section of pipe drains after the summer of 1919, on land that had been under mangolds. Several of the pipes, which were at a depth of $2\frac{1}{2}$ ft., were completely blocked up by mangold roots.

In mentioning crops that are favoured by a hot summer, reference might be made to an old Welsh adage that such a summer brings abundance of wheat, acorns and honey! In North Wales, the harvesting of the mangold crop is rarely begun before November, even though the area of potatoes is small. Where the danger from an early frost is greater, as in East Yorkshire, this work starts about the middle of October. A night or two of mild frost will not cause much damage, since the leaves afford some protection to the standing crop; a crop that has been lifted, but not carted off, is easily damaged, and should be covered with leaves if left overnight. Frosted roots should not be handled until the frost has left them, and they should be stored for using first. In 1925, a proportion of the mangold crop on the College Farm was exposed to several nights of hard frost, which had closely followed many days of continuous rain; by using this portion of the crop first very little actual loss was experienced; the inconvenience was greater than the loss.

In pulling up mangolds, one cannot fail to realize that varieties differ greatly from one another, apart from yield and dry matter. A variety like Long Red is difficult to pull up; it also stands high out of the ground, and is more apt to be damaged by a night's frost. A variety like Giant Orange is not only nearer the ground, but has a good canopy of leaves that give it protection from a night or two of frost. Some varieties, particularly the deeper-coloured ones, are more subject to bolting. Again, when pulling and clamping Lemon Globe, one is impressed by the small amount of soil that adheres to the root—a strong point in favour of this variety.

Opinions differ as to the amount of cleaning that may be prudent when lifting mangolds. Some hold the view that it is unwise to be too free with the knife, since it impairs the keeping quality. Most growers, however, while not cutting off as much of the root as in the case of the swede crop, take off sufficient to free the root of most of the soil. The roots should be cleaned before use, since soil is probably responsible for some of the scouring that is usually associated with

NOVEMBER ON THE FARM

the heavy feeding of mangolds. On a farm that was surprised by an early spring, with heavy supplies of mangolds still on hand, as much as 1 cwt. per day of the well-cleaned roots was fed whole to the cows over a period of three weeks, and no scouring resulted. This was probably due to the freedom from soil, and to the avoidance of the fermentation that takes place when the roots are pulped before use.

In mentioning the cleaning of roots, one may be permitted to relate an anecdote heard in the train on the way to an agricultural show: some occasions in farming life seem to be specially conducive to reminiscences, and travelling up to a show is one of these. On this occasion, the principal of Messrs. S. Corbett, implement makers, related that a predecessor of his, having thought out the idea of a root cleaner, put this to the test by borrowing from a neighbour the drum of a thresher. This worked so well that an implement was accordingly made on these lines, and won a Silver Medal in the Jubilee Royal Show of 1887.

Occasions in farm life that are particularly favourable for anecdotes and reminiscences are not numerous, and are generally fairly well defined. They do not include all intervals when, through some circumstances, work is at a standstill; for instance, if one man is engaged in repairing a binder-breakdown, and the remainder have gathered round waiting for it to start again, one feels instinctively that nobody would trouble to listen to a story or a reminiscence. On the other hand, on the day that one or two neighbours have come to give a hand with killing the pig, the atmosphere is favourable all day—perhaps at its best just before “scalding” begins. Another particularly sociable period is when counting and sharing round rabbits after cutting a field of corn; this atmosphere, however, disappears mysteriously if the principal character has to go at once to help pack the binder.

Sugar-Beet.—Many will, by this time, know how their crop is going to pay them this year. The returns generally make the grower realize that he is but one of many who benefit by the subsidy; by the time labour costs are taken out, together with transport, manure, etc., one feels that there has been quite a general “share out.” This, however, is not grudged, as the object of the subsidy is to keep as many as possible busy on the land. It seems probable, from the very wet weather at the time of writing, that the

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hopes for an early finish of the sugar-beet harvest are not likely to be fulfilled. The interruption of lifting by wet weather, in addition to affecting operations for the succeeding crop, causes further growth and a change in sugar content in the later-sown crops. The break up of the weather, following the dry summer, reminds one of the 1933 conditions. In that year the hopes that the summer conditions would result in high sugar percentages were not realized except for the early lifted crop. An explanation of this was given in this JOURNAL (March, 1934) from the Norfolk Agricultural Station, Sprowston. From trials in which periodic liftings and analyses were made with several varieties, it was shown that, in sugar-beet, the proportion of sugar tends to increase to a peak point, and then to remain stationary or to decline. The dry conditions of 1933 had adversely affected all varieties by inhibiting normal development, but the earlier varieties were not affected to the same extent; and, when the rain came, had not so much growth to make up. With Klein E, much grown as a late crop, the peak was not attained that year until late in the season, so that the bulk of that strain was harvested before it had reached its highest sugar-percentage.

Wheat.—The sowing of wheat has also been interrupted by the rain, and is likely to continue into December. For land that is likely to be sown late, Standard Red (Square-head's Master) is one of the most suitable varieties.

The question of autumn *v.* spring application of nitrogenous manures sometimes comes up for consideration at this time of the year. Spring application is generally superior, especially if the winter proves wet. In the "Book of the Rothamsted Experiments," the effect of autumn and spring applications of ammonium manures on the yields of wheat are classified for 11 wet and for 11 dry winters. The difference in favour of the spring dressing averaged 2.2 per cent. when applied after the dry winters, whereas it amounted to 18.1 per cent. after the winters of high rainfall. It is probable that, where the sowing of the wheat has been preceded by much rain, the difference in favour of the spring dressing would be reduced; an autumn dressing of 1 cwt. per acre of Nitro-chalk, for instance, would help the plant to establish itself in soil where much leaching had occurred.

The Gyrotiller.—When oxen and horses came to be used for cultivating the soil, an implement had to be devised that could utilize the steady pull of the animals for this purpose, and, at the same time, remain in the ground. In whatever part of the world cultivation was practised, this implement took the same form—the plough. There were variations in material, design and attachments, but the essential was much the same everywhere, and consisted of a mould board of some kind which turned over a furrow. The plough remained with but little improvement for thousands of years, until the last half century, when a study was made of the effect of varying the shape of the mould board on the quality of the work, and on the draught. The use of the disc for breaking up the soil is another simple but important improvement of recent years.

With the modern tractors at the disposal of the cultivator, there is available, not only pulling power, but also power that can be transmitted to the implement—direct drive. It is reasonable to suppose that, while the mould board and the disc may be highly suitable where horses or oxen are the source of power, they are not adequate when “direct drive” is available, and that improvement must be sought in a new direction. No amount of specialized study on improving the bow-and-arrow could have produced the modern firearm—old ideas had to be discarded, and efforts made in a new direction. The Gyrotiller (Messrs. J. Fowler and Co., Ltd.) is an implement that has been designed for meeting the new conditions, where something more than pulling power is available. The implement consists essentially of two rings of tillers, revolving in opposite directions, thus breaking up and aerating the soil thoroughly. A suitable seed bed generally results from this one operation when required, but, if necessary, disc or tooth harrows are provided for attaching to the rear of the machine. The horizontal action of the tillers has the important result that mixing of the soil and subsoil does not take place unless required. The Gyrotiller, which is a self-contained, Diesel-operated machine, is built in four sizes, the 30, 40, 70 and 170 h.p. This ample power enables cultivation to be made to a depth reaching 20 in. in the largest and 14 in. in the smallest machine, the width of tilling ranging up to 11 ft. In the 30-h.p. model, the tractor portion can be detached from the cultivating mechanism, and can be used as an ordinary farm tractor.

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The fineness of the tilth is controlled by alteration of the number and type of tillers, and also by their speeds relative to the rate of advance of the implement. For autumn work, the soil can be left fairly rough and open, whereas in spring it can be left in a condition suitable for immediate drilling.

The Gyrotiller first started work in England in the autumn of 1932, but had been proved a great success on the sugar plantations in the West Indies for some years before this. There are at present 50 machines in England, most of which undertake contract work. These work in 30 counties, and, in order to avoid overlapping, the area of operations is mapped out between the contractors. According to the *Scottish Journal of Agriculture* (January, 1935), two machines worked in Scotland in 1934; the average cost of work by contract was 35s. per acre. No machines have, up to the present, reached Wales, the nearest being one in Lancashire and one in Shropshire.

Grass Sheep.—Tupping is over in lowland grass flocks by the beginning of this month; in small flocks, where only one or two rams have been used, a ram lamb that has remained unsold may be run with the ewes in case they have not been served effectively; of all farm animals, the ram is the most likely to be sterile. Work with the flock this month consists only of a few routine jobs, such as trimming feet, repairing fences, etc. Welsh Mountain sheep have the reputation of requiring good fences; some English buyers complain that these sheep are too patriotic, and that, within a short time of arriving in their new quarters, they may be well on the way back to their homeland. A few years ago, a number of mountain sheep with a characteristic face pattern, collected from different parts of the country for experimental work, were grazing a College Farm. On a visitor remarking how numerous they were, and that there seemed to be some in every field, the Professor, jokingly, and perhaps also wishing to dispel the impression of so many strange-looking sheep in the flock, explained that there were not many of them, but that one encountered the same lot several times during a tour of the farm!

When sheep have formed the habit of pushing through or jumping over fences, it is generally the fault of the owner. When a new lot is bought, the fences should be seen to before the sheep are put into the field. If they are

NOVEMBER ON THE FARM

put into a pasture where the hedges are weak, they soon find a way through, especially when the grass gets scarce; once having learnt how easy it is to get to the other side of a fence, the rambling habit cannot be cured. The explanation for what has seemed an astonishing bargain in a small lot of ewes or couples has often come to light within a very short time of bringing them home.

In the mountain flocks proper, tupping is taking place this month. In many large flocks it may prove advantageous to red raddle the rams, in order to mark those ewes that have been served in the first half of the tupping period. Before lambing, these can be separated from the remainder. In this way the flock can be lambed in two lots, and it is possible to avoid bringing the whole flock down together from the hill.

Cattle.—Cattle are brought indoors some time this month. In a mild autumn this may be put off until the latter part of the month. It is difficult not to be surprised each year when forced by cold, wet weather to bring in the cattle, at the seeming lack of appreciation on the part of the cows. There is almost always a drop in the milk yields, in spite of the change from cold, wet fields to a dry cowshed. In the Hosier system of dairying, where cows are out throughout the year, this preference of the cow for being untied and free to wander about the field, is turned into account. During a visit of a party of farmers from this district to the Manor Farm (Mr. Webster Cory), which is about 1,000 ft. up on the Cotswolds, and where this system of milk production is practised, one of the party asked if the herd had remained out during the great frost of 1928-29, and, if so, what the losses were. It was explained that the herd had remained out, and had suffered no loss, but that the milk yield had dropped to nearly one-half; in a few days, however, the yield was back at normal.

If the cattle are left out very late into the autumn, the long hair that is developed is apt to harbour lice. If the cows' hindquarters are clipped, much of this inconvenience disappears. In bad cases, the cattle should be treated with a suitable wash. The worst instance of lice in cattle that I have seen was in a herd of wild cattle, which are out throughout the year. During the winter their necks and shoulders are often covered with blood, caused by rubbing, in an attempt to seek relief.

NOTES ON MANURING

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The Law of Diminishing Returns.—The farmer, in trying to get the greatest possible profit from the use of artificials must decide, year by year, for each crop and for each field, not only the balance between the several components of the fertilizer to be used but also the rate at which it shall be applied.

It is a general fact that the response of a crop to any fertilizer is subject to the Law of Diminishing Returns—that is to say, the return, per cwt. of fertilizer, becomes progressively less as the rate of application is increased. For instance, the first hundredweight per acre may leave a large profit, the second show a satisfactory return, the third pay its way and the fourth show a financial loss.

In practice the problem of finding the most profitable rate of application is a very complicated one. There is, for example, the possibility of residual values, which may be realized in subsequent years. Again, the quantitative response by the crop varies from season to season, and the financial return varies according to the relative prices of the fertilizer and the produce of the crop. The general principle, however, must be borne in mind.

A good and exceptionally simple illustration of the law is provided by a recent report from South Australia* on the response of the wheat crop to varying rates of application of superphosphate, this being the only fertilizer used. A set of experiments on this point has been run at each of four centres over periods varying from thirteen to seventeen years, with the average results given below:—

<i>Superphosphate:</i> <i>cwt. per acre</i>						<i>Yield of Wheat:</i> <i>Bushels per acre</i>	
None	..	.	..	..	..	..	13 9
$\frac{1}{2}$	..	..	..	..	..	..	17 8
1	..	..	..	..	..	..	19 3
2	..	..	..	..	..	..	20.3

It is clear, first, that the response is not in simple proportion to the amount of fertilizer applied; secondly, that some application of superphosphate must have been profitable—

* Department of Agriculture, South Australia: Bulletin 278.

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over an average of years and with any ordinary relationship between the buying price of superphosphate and the selling price of wheat; and thirdly that, at the highest rate of application tried (2 cwt. per acre), the crop was near the end of its capacity to respond to superphosphate, used by itself.

In order to decide the most profitable rate of application of the manure, it is necessary to assume relative prices for superphosphate and wheat. If, for instance, the cost of the fertilizer was 4s. per cwt. and the value of the wheat 3s. per bushel, then the first 2s. spent on the fertilizer produced 11s. 8d. worth of wheat. The second 2s. (required to raise the application to 1 cwt. per acre) gave an increase of 1½ bus., worth 4s. 6d.—again a highly satisfactory result. A further addition of superphosphate, costing 4s. produced an increase of only one bushel, or 3s. worth.

The experiment does not, of course, establish the exact point of maximum profit, but it enables us to conclude that, under the conditions in question this was somewhere between 1 and 2 cwt. per acre.

A further point of interest was the variation in the response at the different centres. At one centre, Roseworthy, the yield on the unmanured plots was 11.2 bushels per acre, while at another, Booborowie, the corresponding figure was 19.5 bushels. It might seem natural to suppose that the possibility of an increase would have been greater at the former centre, but the actual results proved the contrary:—

<i>Superphosphate:</i> <i>cwt. per acre</i>				<i>Wheat: bus. per acre</i> <i>Roseworthy. Booborowie</i>	
0	..	..	..	11.2	19.5
½	..	..	..	16.4	24.5
1	..	..	..	17.9	26.4
2	..	..	..	17.8	28.1

In the first case the limit of response was reached at about 18 bus. per acre, with 1 cwt. of fertilizer per acre, whereas at the other centre the limit was probably not reached, with 2 cwt. per acre, at 10 bus. more. The figures illustrate what is a fairly usual type of result, viz., that the most profitable level of manuring is higher on good than on poor land. For instance, on the fertile silts of Lincolnshire, where the general conditions for potato growing are nearly ideal, the farmer may find it profitable to apply artificials at the rate of 15 cwt. or more per acre, since by so doing he can put up his yield from, say, 8 tons to 12; whereas the effect

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under poorer conditions might be only to increase the crop from 5 tons to 7.

Unfortunately the amount of exact information on this subject, derived from field experiments in this country, is very meagre. Nor can it be supposed that farmers in general have arrived at approximately correct answers to their several problems, for there are often striking differences in the practice followed on neighbouring farms, run upon otherwise similar lines. If one farmer has a manure bill of 20s. per acre while his neighbour, farming on the same system, has one of only 5s. it is impossible to believe that each has found the optimum level of expenditure.

In recent years the Rothamsted Station has been carrying out an increasing number of outside manuring experiments, working in co-operation with farmers in different parts of the country. An improved and simplified lay-out has been devised, enabling answers to be obtained, from one set of plots, to two or three (or even more) separate questions. It is to be hoped that still more work of this kind will be possible in the future, for a great deal remains to be discovered about the profitability of the use of artificials.

Basic Slags and Mineral Phosphates.—This is generally a convenient and suitable season of the year for the routine dressing of pasture land with mineral manures.

Recent pasture research has tended to concentrate largely on other aspects of pasture management, such as the control of grazing, the benefits of mechanical treatment and the use of nitrogenous manures. Developments on these lines are, of course, to be welcomed, but they must not be allowed to distract attention from the importance of maintaining an adequate supply of phosphates in the soil. It is still true that phosphate deficiency is the commonest removable cause of low productivity in pasture, and that an application of phosphate to the grazing ground is often the best investment that the farm offers. This must always remain true, for nearly any system of grassland utilization entails a steady drain on the phosphate reserves of the soil.

The most difficult question to decide, in connexion with the manuring of pasture, is the form of phosphate to be used. It is broadly true that a basic slag of high citric solubility is the most generally reliable form, though super-

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phosphate also gives consistently good results. On certain fields, however, ground mineral phosphate gives, unit for unit, almost or perhaps quite as good results as these more costly forms, and in such cases its use constitutes a very important economy.

The recognition, by eye, of the type of land on which ground mineral phosphate will "work" is by no means easy, but a simple chemical test of the soil reaction (acidity or alkalinity) will often provide a strong clue. If the soil is definitely acid (pH 5.5 or under) good results may be expected from mineral phosphate; while if it be nearly neutral or alkaline (pH 6.5 or more) a satisfactory response is not to be expected. This may be illustrated by a comparison of the average results obtained from various phosphates on a group of neutral soils with those obtained on a group of acid soils, as reported by E. M. Crowther.* The yield of the unmanured plot is given as 100 in each group.

	<i>No Phosphate</i>	<i>Low- Soluble Slag</i>	<i>Ground Mineral Phosphate</i>	<i>High- Soluble Slag</i>	<i>Super- phosphate</i>
Neutral Soils (pH 7.2-7.8)	100	104	102	118	118
Acid Soils (pH 4.9-5.2)	100	117	139	137	137

It is obvious that the only responses were obtained, upon the neutral soils, from the readily soluble forms of phosphate, whereas on the acid soils the ground mineral phosphate was entirely satisfactory.

It is probably true also that ground mineral phosphate is more readily available in areas of high rainfall and on the heavier and more retentive types of soil: but the soil reaction is by much the most important point.

* *Jour. R.A.S.E.*, 95, 1934, p. 48.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended October 23				
	Bristol	Hull	L'pool	London	Cost per unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of ammonia, Neutral (N. 20.6%) ..	6 17d	6 17d	6 17d	6 17d	6 8
Calcium cyanamide (N. 20.6%)	6 17s	6 17s	6 17s	6 17s	6 8
Kainite (Pot. 14%) ..	..	..	..	2 15	3 11
Potash salts (Pot. 30%) ..	..	..	..	4 15	3 2
" " (Pot. 20%) ..	..	..	..	3 12	3 11
Muriate of potash (Pot. 50%) ..	..	..	..	7 16	3 1
Sulphate " " (Pot. 48%) ..	..	..	..	9 6	3 10
Basic slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Ground rock phosphate (P.A. 26-27½%) ..	2 15a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16g	3 6
" " (S.P.A. 13½%) ..	2 15	2 13	2 15f	2 12g	3 10
Bone meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 5f	6 12	..
Steamed bone-flour (N. ½%) P.A. 27½-29½%) ..	5 12	5 5	5 2f	5 10	..

Abbreviations ; N. = Nitrogen ; P.A. = Phosphoric Acid ; S.P.A. = Soluble Phosphoric Acid ; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgewater, at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails ; southern rails 1s. 3d. extra.

NOTES ON FEEDING

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Mortality in Poultry.—It has been said that poultry keeping rose like a rocket in the agricultural firmament, bursting forth in a host of stars—300-egg stars. The simile is apt. Rocket stars have a habit of fading rather quickly. From all over the country to-day there rises a dreadful dirge of death, disease and defect. A hundred supposedly fertile eggs set in an incubator commonly yield about 60 chicks; of the 30 pullets, ten die before they reach laying age, while a further five, perhaps, are culled. A quarter of the selected birds die in their pullet year. One is probably not very wide of the mark in concluding that in British poultry keeping to-day only about 10 per cent. of the eggs set are destined to figure in the vital statistics as 2-year-old birds. To the average poultry keeper mortality has come to be of far greater moment than fecundity—he is less concerned to produce highly fecund birds than to produce hens that will live.

By common consent, this state of affairs has developed very rapidly—the marked rise in laying-test mortalities, for instance, dates from about 1930. The disaster has occurred so suddenly that science is unprepared with satisfactory explanation or remedies. For the time being practitioners must dree their ain weird and grope their own way towards daylight. Certain promising paths, particularly in hygiene, can be pointed out, but for the most part scientific workers can do little more than assemble the facts and (to use their own language) “define the problem.” Beyond doubt poultry mortality is a complex problem. It clears the air a little to dispose at the outset of a general idea that runs through much current discussion—the idea that all these evils originate in the artificial conditions under which poultry keeping is carried on, that if only methods were more “natural” all would be well. This we submit, is an entirely false view.

The death-rate among chickens is certainly pretty large, but it is trivial by comparison with that among most species of wild animals. The odds against any embryonic

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individual reaching maturity are very long indeed. Only by phenomenal wastage can the enormous fecundity of most species be reconciled with the enormous variety of life that obtains. The high death-rate among poultry means, not that methods have been too artificial, but that they have been imperfect; there have been too many loopholes; too many opportunities for the laws of nature to come into play. We are tempted to pursue the naturalistic theme yet further and to observe how closely recent happenings fit the apparent law of nature.

The rise in death-rates in the industry has coincided with the rise in density of population. That is just what occurs in natural communities. Throughout the whole tale of living creatures there seems to run a law of limited numbers. As soon as communities reach a given size something occurs to check activity. In a bacterial culture numbers rise steeply, then remain stagnant, then fall. The same phenomenon is observable in the lower animals, among plant colonies, among most gregarious species of higher animals—and of course among human races. The controlling factor is sometimes disease, sometimes the waste products of metabolism, and sometimes—?—no one knows. It is well to bear in mind these facts when approaching the problem of poultry mortality. If the appeal is to Cæsar, one must be prepared for an adverse verdict.

Disease.—The pathologist's view of disease causation has undergone marked changes in the course of the ages. In the days before Pasteur most diseases were attributed to bodily humours or the evil influence of the gods. Since Pasteur, attention has focussed rather on the parasite than on the host; but there are many diseases for which no causative organism can be found, many more in which the state of the host's body is of at least as much importance as the presence of the parasite. There is clear evidence that disease sometimes arises from faulty diet in an earlier stage of the animal's life history.

As Professor Cowell says: " There is increasing evidence that partial deficiencies of vitamins, particularly during the period of growth, are often responsible for sub-optimal physical development, imperfections in the structure of bodily organs and tissues, lowered resistance to certain infective diseases and many vague subjective and objective symptoms of ill-health " " It has been shown that,

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in dogs at least, the tendency to the development of pyorrhoea alveolaris in adult life is largely determined by the supply of vitamin A which was available during the period of growth" "The original conception of vitamin-deficiency diseases has extended its boundaries to include a variety of diseases attributable to past dietary deficiencies, preventable by suitable feeding during the period of growth."

These weighty words, addressed in the first place to those whose business it is to study human physiology, have their application in modern poultry farming. It has, of course, to be recognized that a good many of the troubles now current are the direct result of heavy stocking and gross infestation of the premises with parasitic worms and other organisms. Mere change of ground, and ordinary hygienic precautions may greatly reduce losses. At Reaseheath, for instance, post-brooding mortality in growing stock in four successive years was as follows:—

1930	...	...	...	2 per cent.
1931	...	...	...	4 ..
1932	...	...	...	17 ..
1933	..	...	...	4 ..

About 1,500 birds were reared on the same land in each of the years 1930-1932. In 1933 a similar number was reared on fresh ground. Other diseases cannot, apparently, be avoided by the simple expedient of running away from the parasite. We have ourselves had heavy losses from coccidiosis among chicks reared entirely on wire mesh floors in batteries and the contraption known as a sun parlour. Such results incline one to look a little further than the parasite for the true cause of the trouble.

Allied to disease are vices. In confinement birds are prone to pull one another's feathers out and peck one another to death. The former vice is objectionable mainly on æsthetic grounds (with the possible exception of a vulture at breakfast, we can recall no more revolting sight than a half-naked hen; but she seems to lay just as well without her feathers as with). The latter becomes on occasion a serious economic problem, and is at all times difficult on humanitarian grounds. These vices are more evident under intensive conditions than when birds have some degree of freedom, though it is by no means certain that confinement is the cause. They are perhaps mere manifestations of native pugnacity, which come to the surface only in the

NOTES ON FEEDING

bored atmosphere of intensive conditions—it is then that Satan finds the mischief for idle beaks to do. Possibly they result from some obscure defect in diet.

Feeding.—There seems to us no valid reason to suppose that disease arises from deficiencies in or excess of any of the major constituents in diets—proteins, fats and so forth, though it may be, as some writers with wide practical experience aver, that the condition in which the food is administered and the times of feeding, affect the tone of the digestive tract. One is on rather uncertain ground in discussing vitamin and mineral supplies. Two valuable reviews of recent research on these subjects have recently appeared. They are rather heavy going for anyone not engaged in that particular line of work, but repay the labour of studying. Every researcher appears to feel that the risk of vitamin shortage among fowls on grass runs is rather remote. Unfortunately very few fowls are on grass runs throughout their lives. Nearly always they are housed intensively during brooding. Is it not possible that vitamin or mineral shortage during brooding comes home to roost later on in life? Battery chicks often grow more quickly at first than chicks brooded by more open-air methods. In a small trial we conducted, comparable lots of chicks reached the following weights:—

	<i>At 4 weeks.</i>	<i>At 8 weeks.</i>
Battery reared ...	5.3 oz.	16 oz.
Hover reared ..	3.6 oz.	18 oz.

The battery chicks “overgrew their strength” in the heated seclusion of the trays, and ultimately made poorer birds than the hover-reared chicks.

Vitamin A, absence of which results in “staggers” and a lowering of resistance to respiratory and alimentary infections, is present in cod-liver oil and in yellow maize, in such quantities that deficiencies at any stage of the fowl’s life is unlikely. The water-soluble compounds falling in the B group are all plentiful in cereals; while C is normally synthesized in the bird’s body. About adequate supplies of D, however, there are elements of doubt. Cod-liver oils vary greatly in D content; irradiated ergosterol is certainly a much less efficient source of this vitamin than cod and halibut oils; and sunlight is not always an effective generator. Several research workers observe that when opportunity is given for chicks to come out into sunlight

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not all avail themselves of their chances. Despite all that has been written about vitamin D it is more than possible that troubles still arise from shortage of this ingredient during brooding at least. There remains too the possibility of vitamins as yet undiscovered.

The position as regards minerals is still more obscure. Only two elements so far have received much study—calcium and phosphorus. That is unfortunate. Certain diseases of other animals have been traced to shortage of quite rare minerals. There is a dreadful disease of sheep in Australia, for instance, which appears to arise from shortage of cobalt. One has the feeling that the researchers may be labouring the calcium problem while all the while our fowls are dying for want of cadmium or zirconium.

The tale of calcium and phosphorus, however, is complex enough to satisfy most searchers after knowledge. In neither case have we to deal with what one may call a straight issue. It is not simply a question of determining how much calcium or phosphorus a bird needs. The calcium requirements depend in part on the phosphorus supply; and the assimilability of each is linked with the salt supply and also with the vitamin D supply. Moreover, the requirements of all these ingredients vary with the stage of life of the bird. The power of the pullet to assimilate calcium, for example, rises very sharply as she comes into lay. Finally, one has to bear in mind that an excess of calcium or phosphorus may, in certain circumstances, be as disastrous as shortage.

It is with something approaching relief that one turns from these involved problems of fundamental research to the more "practical" studies of the Northern Ireland workers. The latter experiments make it clear that when chicks that have access to a grass run are reared on a cereal and soya bean mash, common salt must be added to the ration; nothing is gained by adding iron, potash, iodine, sulphur or phosphorus. As far as it goes, this is good hearing; but it is important to note that the finding applies only to chicks reared on grass, and, further, that even among the salt-fed birds mortality in different trials ranged from 6 to 40 per cent. While it is clear that the addition of salt reduced losses—sometimes very markedly—it is equally clear that it is no panacea, while the connexion between disease and the many other mineral elements not taken into account in these trials, must for the time being

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remain an open question. Far and away the best results so far reported from this centre have been obtained from the addition of milk to the chicks' ration.

Breeding.—It is widely held that most of our troubles to-day are due to faulty breeding methods. This belief is commonly expressed by saying that breeders have lost stamina (or constitution). Really this does not advance matters very much. Until some one is brave enough to define constitution (or stamina) more nearly than as the capacity to live it amounts to saying that birds die because they have not got the power to live. Yet doubtless it contains more than a germ of truth, and our excuse for introducing the theme here is that it suggests a line of thought concordant with that reached in an earlier paragraph.

If, in every generation, a number of birds with physical or physiological defects are born and all are reared, the adult death-rate will naturally be higher than if only the strongest are reared. In such circumstances it would appear that skilful brooding under optimum conditions may in the end defeat its own object. If some birds are foredoomed to early demise, every effort should be made to detect them as soon as possible. The nearer to ideal the brooding conditions become, the more difficult early detection of weaklings becomes. Unfortunately, few records of rearing results twenty years ago are nowadays obtainable. Competent observers aver, however, that they were seldom as good as to-day. If so, we are to-day rearing many chicks which in years gone by would have been weeded out in early life. On purely practical grounds there is much to be said for the view that chicks should be exposed to fairly rigorous conditions early in life with the strict injunction "if you intend dying, please die at once and be done with it."

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	/ s.	/ s.		s. d.	d.	%
Wheat, British	5 18	0 8	5 10	72	1 6	0-80	9-6
Barley, British feeding	5 15	0 7	5 8	71	1 6	0-80	6-2
" Canadian, No. 3 Western ..	5 10	0 7	5 3	71	1 5	0-76	6-2
" Persian	5 8	0 7	5 1	71	1 5	0-76	6-2
" Russian	5 10	0 7	5 3	71	1 5	0-76	6-2
Oats, English, white	6 10	0 8	6 2	60	2 0	1-17	7-6
" " black and grey	6 10	0 8	6 2	60	2 0	1-07	7-6
" Canadian, No. 2 Western ..	8 3	0 8	7 15	60	2 7	1-38	7-6
" " mixed feed	6 12	0 8	6 4	60	2 1	1-12	7-6
Maize, Argentine	4 8	0 6	4 2	78	1 1	0-58	7-6
" Russian	4 7†	0 6	4 1	78	1 0	0-54	7-6
" South African, No. 4, yellow	4 12†	0 6	4 6	78	1 1	0-58	7-6
" " " No. 2, white, Flat	4 8†	0 6	4 2	78	1 1	0-58	7-6
Beans, English, Winter	6 0§	0 15	5 5	66	1 7	0-85	19-7
Peas, Indian	8 15†	0 13	8 2	69	2 4	1-25	18-1
" Japanese	15 12†	0 13	14 19	69	4 4	2-32	18-1
Dari	6 15†	0 7	6 8	74	1 9	0-94	7-2
Milling offals—Bran, British ..	6 2	0 14	5 8	43	2 6	1-34	9-9
" " broad	6 12	0 14	5 18	43	2 9	1-47	10
Middlings, fine, imported ..	6 5	0 12	5 13	69	1 8	0-80	12-1
Weatings†	6 12	0 12	6 0	56	2 2	1-16	10-7
" Superfine†	7 5	0 12	6 13	69	1 11	1-03	12-1
Pollards, imported	5 15	0 12	5 3	50	2 1	1-12	11
Meal, barley	6 17	0 7	6 10	71	1 10	0-98	6-2
" " grade II	6 2	0 7	5 15	71	1 7	0-85	6-2
" maize	5 2	0 6	4 10	78	1 3	0-67	7-6
" " South African	4 17	0 6	4 11	78	1 2	0-62	7-6
" " germ	5 2	0 10	4 12	84	1 1	0-58	10-3
" locust bean	7 15	0 5	7 10	71	2 1	1-12	3-6
" bean	8 5	0 15	7 10	66	2 3	1-21	19-7
" fish (white)	13 15	1 19	11 16	59	4 0	2-14	53
Maize, cooked, flaked	5 15	0 6	5 9	84	1 4	0-71	9-2
" gluten feed	5 15	0 12	5 3	76	1 4	0-71	19-2
Linseed cake, English, 12% oil ..	8 2	0 18	7 4	74	1 11	1-03	24-6
" " " 9% "	7 15	0 18	6 17	74	1 10	0-98	24-6
" " " 8% "	7 10	0 18	6 12	74	1 9	0-94	24-6
" " " 6% "	7 17§	0 18	6 19	74	1 11	1-03	24-6
Soya-bean cake, 5% oil	7 17§	1 5	6 12	69	1 11	1-03	36-9
Cottonseed cake, English, Egyptian seed, 4½% oil	4 12	0 10	3 16	42	1 10	0-98	17-3
" " Egyptian 4½% "	4 10	0 16	3 14	42	1 9	0-94	17-3
" " decorticated 7% "	6 17†	1 5	5 12	68	1 8	0-89	34-7
" meal, decorticated, 7% " ..	6 15†	1 5	5 10	70	1 7	0-85	36-8
Coconut cake, 6% oil	6 7	0 16	5 11	77	1 5	0-76	16-4
Ground nut cake, 6-7% oil	6 5*	0 17	5 8	57	1 11	1-03	27-3
" " " decor., 6-7% oil	7 5	1 5	6 0	73	1 8	0-89	41-3
" " " imported decorti- cated 6-7% oil	6 17	1 5	5 12	73	1 6	0-80	41-3
Palm-kernel cake, 4½-5½% oil ..	5 17†	0 11	5 6	73	1 5	0-76	16-9
" " " meal 4½% oil	5 15†	0 11	5 4	73	1 5	0-76	16-9
" " meal, 1 2% oil	5 12	0 11	5 1	71	1 5	0-76	16-3
Feeding treacle	4 15	0 7	4 8	51	1 9	0-94	2-7
Brewers' grain, dried ale	5 0	0 10	4 10	48	1 10	0-98	12-3
" " " porter	4 12	0 10	4 2	48	1 8	0-89	12-3
Dried sugar-beet pulp (a)	5 15	0 5	5 10	66	1 8	0-89	5-2

(a) Carriage paid in 5 ton lots. * At Bristol. § At Hull. † At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

PRICES OF FEEDING STUFFS

NOTE.—The prices quoted opposite represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of September, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 18s. per ton as shown above, the cost of food value per ton is £9 2s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 6½. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.34d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N., 6s. 7d. P₂O₅, 2s. 1d. K₂O 3s. 1d.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	Starch equivalent		Protein equivalent		Per ton
	Per cent.	Per cent.	Per cent.	Per cent.	£ s.
Barley (imported)	71	62			5 9
Maize	78	76			4 8
Decorticated ground-nut cake	73	41.3			7 1
„ cottonseed cake	68	34.7			6 17
(Add 10s. per ton, in each instance, for carriage)					

The cost per unit starch equivalent works out at 1.32 shillings and per unit protein equivalent 1.47 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the November, 1934, issue of the Ministry's JOURNAL, p. 808.)

FARM VALUES.

Crop	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9.6	5 9
Oats	60	7.6	4 10
Barley	71	6.2	5 3
Potatoes	18	0.8	1 5
Swedes	7	0.7	0 10
Mangolds	7	0.4	0 10
Beans	66	19.7	5 16
Good meadow hay	37	4.6	2 16
Good oat straw	20	0.9	1 8
Good clover hay	38	7.0	3 0
Vetch and oat silage	13	1.6	1 0
Barley straw	23	0.7	1 11
Wheat straw	13	0.1	0 17
Bean straw	23	1.7	1 13

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

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The Improvement of Native Agriculture

"THE Improvement of Native Agriculture in Relation to Population and Public Health" is the subject of a course of five lectures to be given by Sir Daniel Hall, K.C.B., LL.D., F.R.S., at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1, during the present month. These "Heath Clark" lectures, under the auspices of the University of London, will be given at 5 p.m. on each of the following dates:—November 6, "Soil Exhaustion"; November 11, "Regenerative Systems of Farming"; November 13, "The Improvement of Native Agriculture"; November 18, "Overstocking and Soil Erosion"; November 20, "The National Dietary." The lectures are open to the public, admission free, without ticket.

Stud Goat Scheme, 1934-35

THE report on the operation of this scheme during its eleventh season has now been issued. Thirty-four counties were represented, Anglesey for the first time, while Gloucestershire and Hampshire re-entered the list. Fifteen new centres were opened. Of 76 goats registered at 76 centres, only three failed to qualify for premium, while of the others sixteen earned the maximum of £5. The average premium earned was £2 18s. The same three counties headed the list for services as last year, viz., Durham, Yorkshire and Suffolk. The report records a number of instances showing the beneficial effects of the scheme. A village shopkeeper owns a herd of British Alpines descended from one nanny, and each animal in it was sired under the scheme. Three of the goats have yielded respectively as much as 15 lb., 12 lb. and 8 lb. in a day. A country postman, who has had a billy at stud for several seasons, recently declined an offer of £18 for his best nanny and her kid, as he desired to maintain his supply of milk for sale to the cottagers in the neighbourhood. It is stated that, in one district in which the scheme has been operated since its inception, all the goats have improved both in stamina and in milk yield. It is interesting to note

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that one of the goats recently standing under the scheme is a son of Ch.R5 Mostyn Marigold Q*Q* which has established a record milk yield of 5,321 lb. 9 oz. for the year ended October 1 last. This goat has now yielded 27,357 lb. 8 oz. in the past six recorded years, an average of 4,559 lb. 9 oz. per annum.

The Agricultural Index Number

THE general index number of prices of agricultural produce for September was 121 (base 1911-13 = 100) or 8 points higher than in August, and 2 points above the figure recorded for September, 1934. (If allowance is made for payments under the Wheat Act, 1932, and Cattle Industry (Emergency Provisions) Act, 1934, the revised general index for the month under review would be 128.) A few commodities such as hay, oats, bacon pigs and eggs were cheaper than in August, but others such as barley, fat cattle, pork pigs, dairy cows and milk were dearer. The rise in the general index is, however, attributable almost entirely to the rise of 3d. per gallon in the wholesale contract price of milk in September.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month.	1930	1931	1932	1933	1934	1935
January	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	114
August	135	121	105	105	119	113
September	142	120	104	107	119	121
October	129	113	100	107	115	
November	129	112	101	109	114	—
December	126	117	103	110	113	

Grain.—The average price for wheat at 4s. 10d. per cwt. was unaltered on the month, but as there was a decline in September, 1911-13, the index has appreciated by 4 points. The revised index, allowing for deficiency payment under the Wheat Act, would be 124. The barley average rose from 7s. 10d. per cwt. in August to 10s. 1d. in September, owing to the usual seasonal increase in offerings of malting varieties, and the index also rose by 18 points to 121. A year ago the index was 127. Oats were 4d. per cwt. cheaper

MISCELLANEOUS NOTES

at an average of 6s. 1d., and the index declined 2 points to 90, as compared with 98 last year.

Live Stock.—Fat cattle values were fairly well maintained during September, although a cheaper trend developed at the end of the month; the average of 31s. 6d. per live cwt. for second quality cattle was 4d. higher than for August and the index moved upwards 2 points to 94. This index was, however, 10 points below a year ago. The effect of adding the cattle payment of 5s. per live cwt. would be to raise the September index to 109. Fat sheep showed no alteration in price or index number, but in this case also the level was 10 points below September, 1934. Prices for bacon pigs declined by 6d. per score and the index fell 5 points to 93, but porkers were dearer by 4d. per score and the index 1 point higher at 98. There was a seasonal increase of about £1 per head in dairy cows, and store sheep and pigs also showed increases; the indices were higher in all three instances. The slight rise in prices of store cattle was not as large as in September of the base years, and the index fell 1 point to 88, which was also the figure recorded a year ago.

Dairy and Poultry Produce.—The wholesale contract price of milk for all regions this September was fixed at 3d. per gallon more than for August: it was also 3d. more than in the South-Eastern region last September and 4d. more than in all the other ten regions. The index, therefore, showed a rise of 40 points on the month and a rise of 47 on the year. Farm butter was unchanged in price and cheese was slightly cheaper, but in both instances there was a fall in the index. Egg quotations fell a little, whereas there was a rise in September of the base years and the index dropped 14 points to 119: at this level, however, it was still 16 points above a year ago. Poultry prices were very little changed on the month.

Other Commodities.—The change from early varieties to main crop varieties resulted in a rise of 10 points in the potato index, which at 147 was 11 points below that for September, 1934. Hay was about 4s. per ton cheaper on the month, and the index declined by 6 points to 95. Apples and plums were both very dear, the former being more than twice and the latter more than three times their pre-War price. Vegetables averaged about one-and-a-half times the 1911-13 values. Wool was unaltered either in price or index.

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Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity	1933	1934	1935			
	Sept.	Sept.	June	July	Aug	Sept.
Wheat	63	68	69	68	60	64
Barley	129	127	94	88	103	121
Oats	78	98	98	99	92	90
Fat cattle... ..	99	104	90	93	92	94
" sheep... ..	100	124	124	117	114	114
Bacon pigs	101	102	105	101	98	97
Pork "	106	109	103	97	97	95
Dairy cows	110	105	100	100	102	105
Store cattle	94	88	92	94	89	88
" sheep	83	113	100	113	111	124
" pigs	132	142	115	114	118	122
Eggs	115	103	107	114	133	119
Poultry	121	117	123	120	115	117
Milk	160	168	162	175	175	215
Butter	98	87	89	87	92	89
Cheese	110	94	98	99	85	78
Potatoes	99	158	137	166	137	147
Hay	73	104	100	99	101	95
Wool	76	87	85	86	89	89

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	127	116	109	107	117	124
Fat Cattle... ..	—	119	104	107	107	109
General Index	111	125	117	120	120	128

Avoncroft College for Rural Workers, Worcestershire

A CAPITAL grant has been sanctioned towards the cost of removing the Avoncroft College for Rural Workers from Offenham, near Evesham, to Stoke Prior Grange, Bromsgrove. The object is to move the college into a part of the county more suitable for general farming than the Evesham district. Accommodation for thirty students will be provided, and more adequate facilities than exist in the old quarters will be given for training in the technique of agricultural practice—including glasshouse work, milk production, poultry and pig keeping, and some demonstrations in arable cropping.

In addition, a small annual grant towards maintenance has been sanctioned. This grant, which is on a capitation basis, is calculated in a similar manner to the Board of Education grants to working men's colleges in urban areas.

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Advisory Leaflets

SINCE the date of the list published in the August, 1935, issue of this JOURNAL (p. 506) the undermentioned Advisory Leaflets have been issued by the Ministry:—

- No. 20. "Blackhead" of Turkeys (Revised).
- No. 31. Sheep-Dipping (Revised).
- No. 65. The Magpie Moth (Revised).
- No. 101. Insurance of Farming Stock against Fire (Revised).
- No. 104. The Raspberry Beetle (Amended).
- No. 251. The Cuckoo.
- No. 252. Utilization of Poultry Feathers.
- No. 253. Crown Gall.
- No. 256. Wheat Growing.
- No. 257. Green Manuring.

Copies of any of the above-mentioned leaflets may be purchased from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, or at the Sale Offices of that Department at Edinburgh, Manchester, Cardiff and Belfast, price 1*d.* each net (1½*d.* post free), or 9*d.* net per doz. (10*d.* post free).

Single copies of not more than 20 leaflets may, however, be obtained, free of charge, on application to the Ministry. Further copies beyond this limit must be purchased from H.M. Stationery Office, as above.

A list of the Ministry's publications, including leaflets, on agriculture and horticulture may be obtained free and post free on application to the Ministry.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1, on Monday, October 14, 1935, W. B. Yates, Esq., C B E., J. P., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages, and proceeded to make the following Orders:—

Cheshire.—An Order continuing the operations of the existing minimum and overtime rates from November 1, 1935 (i.e., the day following that on which the existing rates are due to expire) until October 31, 1936. The minimum rates for male workers of 21 years of age and over are 32*s.* 6*d.* per week of 54 hours with overtime at 8½*d.* per hour. For female workers of 18 years of age and over the minimum rate is 6*d.* per hour for all time worked, provided that in the case of female workers engaged for milking such workers shall receive not less than 6*d.* per "meal" (i.e., each occasion on which the worker visits her place of employment for the purpose of milking).

Lincolnshire (Holland).—An Order fixing minimum and overtime rates of wages to come into force on October 27, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until October 24, 1936. The minimum rates for male workers of 21 years of age and over are 34*s.* per week of 48 hours in winter, except in the week in which Christmas Day falls, when the hours are 39½, and 50 hours in summer, except in the weeks in which Easter Monday, Whit Monday and August Bank Holiday fall when the

MISCELLANEOUS NOTES

hours are 41. For horsemen, cattlemen and shepherds of similar age inclusive weekly sums are fixed to cover all time worked in excess of the number of hours mentioned above, except employment which is to be treated as overtime employment. The overtime rates in the case of male workers of 21 years of age and over are 10½d. per hour on Saturdays (or any other day agreed as the weekly short day); 1s. 1½d. per hour on Sundays and on Christmas Day; 8d. per hour on Easter Monday, Whit Monday and August Bank Holiday, and 9d. per hour for all other overtime employment. The minimum rate for female workers of 15 years of age and over is 6d. per hour for all time worked.

Carmarthenshire.—An Order fixing minimum and overtime rates of wages to come into force on November 15, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until November 14, 1936. The minimum rates for male workers of 21 years of age and over are 31s. 6d. for a six-day week (instead of a seven-day week as at present) of 54 hours with overtime at 8½d. per hour on weekdays, Sundays and Christmas Day (instead of weekdays only as at present), and for female workers of 18 years of age and over 5d. per hour with overtime at 6d. per hour on weekdays, Sundays and Christmas Day (instead of weekdays only as at present).

Radnor and Brecon.—An Order continuing the operation of the existing minimum and overtime rates of wages from November 1, 1935 (i.e., the day following that on which the existing rates are due to expire) until April 30, 1936. The minimum rates for male workers of 21 years of age and over are 30s. per week of 50 hours in winter and 54 hours in summer, with overtime at 9d. per hour. For female workers of 18 years of age and over the minimum rate is 5d. per hour with overtime at 6½d. per hour on weekdays and 7½d. per hour on Sundays.

Enforcement of Minimum Rates of Wages.—During the month ending October 14, 1935, legal proceedings were taken against ten employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered			No. of workers involved	
		£	s.	d.	£	s.	d.	£	s.	d.		
Devon	Tiverton				16	0	2	0	0		1	
Essex	Ongar	1	0	0	—			30	0	0	1	
Lancashire	Bury	10	0	0	3	18	0	13	5	0	2	
Monmouth	Bedwas	1	0	0		5	0	25	0	0	1	
"	Caerleon		2		3	3	0	3	5	0	1	
Salop	Clun		4	0	1	6	0	158	0	0	4	
"	"	2	0	0	1	5	6	35	16	6	2	
"	"		†					—			3	
"	Oswestry		10	0	—			2	7	3	1	
"	Whitchurch	1	0	0				15	14	2	2†	
		£	15	14	0	10	13	6	285	7	11	18

* Dismissed under the Probation of Offenders Act.

† Dismissed.

‡ Case of one worker dismissed.

WIRELESS TALKS TO FARMERS IN NOVEMBER

Foot-and-Mouth Disease.—Three further outbreaks of Foot-and-Mouth Disease in Glamorgan, six in Monmouth and one in Warwickshire were confirmed between September 28 and October 17. There have been twelve outbreaks in all in the South Wales infected area and two in the Warwickshire area since the initial outbreaks were confirmed on September 24 and 25.

WIRELESS TALKS TO FARMERS IN NOVEMBER

<i>Station</i>	<i>Date Nov.</i>	<i>Time p.m.</i>	<i>Speaker</i>	<i>Subject</i>
National	6, 13, 20, 27	7.5	Professor J. A. Scott Watson and various experts	For Farmers Only
Midland and North	1	8.0	Messrs. W. B Thompson and W. B Mercer	Discussion on Exhibits at the Dairy Show
Midland	7	8.30	Mr. S L Bensusan	Land Settlement pro- jects
	11	7.40	Mr. Walter Pitchford	Our Country Corres- pondent Northamp- tonshire
	15	6.30	Mr. W. B. Thompson	For Midland Farmers
West	6	not stated	Messrs F G. Thomas, F Jones and a parent	The Changing Village; the Village School
	13	not stated	Messrs. F G. Thomas, W. C. Milton, and W. H. Sutton	The Changing Village; Town into Village
	14, 28	not stated	Mr. A W. Ling	For Western Farmers
	25	8.25	Not settled	Gunter's Farm; Glou- cestershire farming
	27	7.30	Various	The Changing Village: Symposium of views on former talks
Scottish	1, 15	6.40	Mr. A. D. Buchanan Smith	For Scottish Farmers
	7	7.0	Dr. W. G. Ogg	Reclamation of Waste Land
	21	7.15	Not settled	Smallholdings — (1) Settlement
N. Ireland	1	7.15	Mr. Peter Fitzpatrick	Farmers Work and Worry
	8	8.30	Not settled	For Ulster Farmers
	15	8.15	Mr. Peter Fitzpatrick	Farmers Work and Worry
	22	6.45	Not settled	For Ulster Farmers
	29	not stated	Mr. Peter Fitzpatrick	Farmers Work and Worry

BOOK NOTICE

APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS ENGLAND

Cornwall.—Mr. W. N. Day, M.A., has been appointed Assistant Lecturer in Agriculture, *vice* Mr. T. Dawson, B.Sc. (Agric.), N.D.A.

Mr. J. A. Wyatt, B.Sc. (Agric.), N.D.A., N.D.D., has been appointed Temporary Assistant Lecturer in Agriculture (part time).

Mr. W. H. Damerell has been appointed Head Gardener and Instructor at the Ellbridge Experimental Station (Tamar Valley), *vice* Mr. E. Beckley.

Essex.—Miss L. C. Style, N.D.H., has been appointed Temporary Student Instructor in Horticulture, *vice* Miss C. L. Jary, B.Sc. (Hort.).

Mr. K. W. B. Allen has been appointed Temporary Student Instructor in Poultry-keeping.

Hampshire.—Mr. G. R. H. Bishop, B.Sc. (Agric.), N.D.A., has been appointed Dairy Instructor at the County Farm Institute, Sparsholt, *vice* Miss F. J. Atkinson, N.D.D.

Mr. N. F. Smith has been appointed Manager of the County Egg-laying Trials, *vice* Mr. W. Inglis.

Warwickshire.—Mr. C. T. Riley, N.D.P., has been appointed Manager-Recorder of the County Egg-laying Trials, *vice* Mr. F. O. Morris, N.D.P.

BOOK NOTICE

The Observations of an Owner-Occupier. By Guy Blewitt. Introduction by Sir Edward Grigg, K.C.M.G., K.C.V.O., D.S.O., M.C. Pp 65 (Chelmsford: J. H. Clarke & Co., 77-78, High Street. 1935. Price 2s.)

In this pamphlet, the author relates an experience of twelve years as owner-occupier of a mixed farm in Essex. The story originally appeared in serial form in *The Essex Farmers' Journal*, and is republished for the benefit of a wider public that will be interested in the observations of a practical agriculturist. The seven chapters devoted to management, labour, the balance-sheet, buying and selling, rations, breeding and crops respectively, are followed by tables of dairy and pig rations, and a specimen quarterly feed sheet.

Perhaps not everyone will accept the view that "from a national point of view, it is much more important for the farmer to employ twice the labour at the present wage than the same labour at twice the wage." Col. Blewitt defends the existing standard of living of the agricultural labourer. "If there is hardship," he suggests, "it is in the legislation which necessitates the payment of ridiculous wages in the towns The business of producing food will never allow of extravagant wages or the employment of anyone who is not pulling full weight."

Possibly the most interesting chapter is that concerned with the Balance Sheet, which must be ultimately the test of success or failure in any business. During his twelve years of farming Col. Blewitt has admittedly lost money, but "in fairness to agriculture" he suggests that "had the money been invested in anything else, the losses might quite easily have been greater." There will be differences of opinion with regard to many of the author's conclusions, but most readers will agree with Sir Edward Grigg when he says: "The more men we can attract to the land with Guy Blewitt's spirit and intelligence the better for England."

ADDITIONS TO THE LIBRARY

Agriculture, General and Miscellaneous

- Thomas, W. B. (Sir).*—Village England. (xii + 302 pp. + 16 pl.) London: A. Maclehose & Co., 1935, 8s. 6d.
- Bayne-Powell, R.*—English Country Life in the 18th Century. (xiii + 319 pp. + 8 pl.) London: Murray, 1935, 10s. 6d.
- Grey, E.*—Cottage Life in a Hertfordshire Village. (253 pp.) St. Albans: Fisher, Knight & Co., 1934, 3s. 6d.
- International Agricultural Directory.*—Published by W. G. Wilson, 777, Concord Avenue, Cambridge, Massachusetts, 1934.
- Savoy, E.*—L'agriculture à travers les âges. Histoire des faits, des institutions, de la pensée et des doctrines économiques et sociales. Tome I. Quelques problèmes d'économie sociologiques prolégomènes. (xvi + 667 pp.) Paris: E. de Boccard, 1935.
- Aggs, W. H.*—Jackson's Agricultural Holdings, being the Agricultural Holdings Act, 1923, with introduction and explanatory notes and forms, together with a Manual on Tenant-Right Valuation. (8th Edition.) (xvi + 392 pp.) London: Sweet and Maxwell, 1934, 12s. 6d.
- Irish Free State, Dept. of Industry and Commerce.*—Agricultural Statistics, 1927-1933. Report and Tables. (xxxiv + 135 pp.) Dublin: Stationery Office, 1935, 1s. 9d.
- Midland Agricultural College.*—Farmers' Bulletin No. 3:—Analysis of Financial Accounts. Derbyshire, 1931-33. (28 pp. + 6 pp. Appendix.) (Mimeographed.) Sutton Bonington, 1933.
- University of Oxford: Institute for Research in Agricultural Engineering.*—Farm Wiring, by C. A. Cameron Brown. (32 pp. + 4 pl.) Oxford, at the University Press, 1935, 1s.
- Gunn, E.*—Farm Buildings, New and Adapted. A Guide for Farmers, Land Agents and Architects. Edited by H. C. Long. (86 pp. + 12 pl.) Published by H. C. Long, "The Birkins," Orchard Road, Hook, Surbiton, Surrey, 1935, 5s.
- The Commons, Open Spaces and Footpaths Preservation Society.*—Commons. Village Greens and Other Open Spaces. Their Protection and Control, with Special Reference to the Powers of Parish Councils, by H. Baker. (15 pp.) London, 1935, 6d.
- The National Joint Industrial Council for the Flour Milling Industry.*—Technical Education Series, Pamphlet No. 3:—Flour Quality: Its Nature and Control, by E. A. Fisher (58 pp.) (2nd Edition.) London, 1935, 6d.
- Laborde, R.*—Le miel des abeilles dans ses applications diététiques et médicales. (102 pp.) Bordeaux: J. Bière, 1934, 11 fr.
- University of Reading, Faculty of Agriculture and Horticulture.*—A Soil Survey of the Eastern Portion of the Vale of the White Horse, by F. F. Kay. (187 pp. + 2 maps.) Reading, 1934.
- Ministry of Health.*—Report on Greater London Drainage, with Tables, Diagrams, Plans and Appendices. (116 pp.) London: H.M. Stationery Office, 1935, 17s. 6d.
- Harvey, A. S.*—Merchandise Marks Laws and Regulations (vii + 277 pp.) London: Sir Isaac Pitman & Son, 1934, 7s. 6d.
- Ministry of Agriculture and Fisheries.*—Report of the United Kingdom Sugar Industry Inquiry Committee. (123 pp.) (Cmd. 4871.) London: H.M. Stationery Office, 1935, 2s.

ADDITIONS TO THE LIBRARY

- ✓ *Tansley, A. G., and James, W. O.*—*Elements of Plant Biology.* (389 pp.) (Revised Second Edition) London: Allen & Unwin, 1935, 10s. 6d.
- Food Research Institute, Stanford University.*—*Fats and Oils Studies No. 5:—The American Vegetable Shortening Industry. Its Origin and Development,* by *G. M. Weber* and *C. L. Alsberg.* (xii + 359 pp.) Stanford University Press, 1934, \$3.50.
- Kirkman, F. B. and Jourdain, F. C. R.*—*British Birds.* (xvi + 179 pp. + 200 coloured plates) London and Edinburgh. T. C. and E. C. Jack, 1932, 21s
- Batten, H. M.*—*Our Country's Wild Animals* (108 pp. + 20 pl.) London and Edinburgh. Nelson & Jack, 1935, 3s. 6d.

Agricultural Economics

- Brinkman, T.*—*Economics of the Farm Business.* English Edition with Introduction and Notes by *E. J. Benedict, H. H. Stippler* and *M. R. Benedict.* (x + 172 pp.) Berkeley, California: University of California Press. Great Britain and Ireland: Cambridge University Press, 1935, 9s.
- United States Department of Agriculture.*—*Bureau of Agricultural Economics. Farm Production and Income from Meat Animals, 1930-1934.* (49 pp., mimeographed.) Washington, 1935.
- League of Nations, Economic Committee.*—*Considerations of the Present Evolution of Agricultural Protectionism.* (49 pp.) London: Allen & Unwin, 1935, 1s. 6d.
- Knapp, W. H. C.*—*World Dislocation and World Recovery. Agriculture as the Touchstone of the Economic World Events.* (vii + 203 pp.) London. P. S. King & Son, 1935, 10s. 6d.
- Leuke, H. M.*—*Unity, National and Imperial.* (320 pp.) London: Allen & Unwin, 1935, 8s. 6d.
- Jenks, J. E. F., and Peddie, J. T.*—*Farming and Money.* (108 pp.) London: Christian State Publishing Co., 1935, 3s. 6d.
- Verwey, G., and Renoot, D. C.*—*The Economists' Handbook. A Manual of Statistical Sources.* (viii + 460 pp.) Amsterdam, 1934, 35s.
- Steden, A.*—*Die betriebswirtschaftlichen Grundlagen der Landwirtschaftsförderung.* (205 pp.) Herausgegeben von der Niederösterreichischen Landes-Landwirtschaftskammer im Agraarverlag Wien, 1935, R.M. 7.
- Layton, Sir W. T., and Crowther, G.*—*An Introduction to the Study of Prices.* (2nd Edition.) (xiv + 280 pp.) London: Macmillan, 1935, 8s. 6d.
- Scott, J. W.*—*Self-Subsistence for the Unemployed. Studies in a New Technique.* (223 pp.) London: Faber & Faber, 1935, 6s.
- Dummeier, E. F., and Heflebower, R. B.*—*Economics with Applications to Agriculture.* (x + 742 pp.) New York and London: McGraw-Hill Publishing Co., 1934, 22s. 6d.
- Gilboy, E.*—*Wages in Eighteenth Century England* (Harvard Economic Studies. Vol. XLV.) (xxix + 297 pp.) (London: Humphrey Milford; Cambridge (U.S.A.): Harvard University Press, 1934, 15s.
- Canada.*—*Report of the Royal Commission on Price Spreads.* (xxx + 506 pp.) Ottawa, 1935. \$1.
- Tugwell, R. G.*—*The Battle for Democracy.* (vi + 330 pp.) New York: Columbia University Press; London: Humphrey Milford, 1935, 15s.
- Stanford University, Food Research Institute.*—*Miscellaneous Publication No. 7:—Population Theories and Their Application, with Special Reference to Japan,* by *E. F. Penrose.* (xiv + 347 pp.) Stanford University Press, 1934, \$3.50.

ADDITIONS TO THE LIBRARY

Agricultural Education and Research

- Ashby, A. W.*—The Sociological Background of Adult Education in Rural Districts. (2nd Edition.) (27 pp.) London: British Institute of Adult Education, 1935, 6d.
- Matthews, A. A.*—Education for Life. A Country School Experiment. (112 pp. + 12 pl.) London: Nelson, 1935, 2s. 6d.
- Johnson, P. O.*—Aspects of Land Grant College Education, with special reference to the University of Minnesota. (xi + 271 pp.) Minneapolis: The University of Minnesota Press; London: Humphrey Milford, 1934, 11s. 6d.
- Royal Commission on the University of Durham.*—Report. (Cmd. 4815.) (94 pp.) London: H.M. Stationery Office, 1935, 1s. 6d.
- Hall, Sir D., and Others.*—The Frustration of Science. (144 pp.) London: Allen & Unwin, 1935, 3s. 6d.
- Hall, Sir D.*—The Pace of Progress. The Rede Lecture, 1935. (42 pp.) Cambridge, at the University Press, 1935, 1s. 6d.

Agricultural Marketing and Co-operation

- Conacher, H. M.*—The Agricultural Marketing Acts, with Introduction, Notes, &c. (192 pp.) Edinburgh: W. Green & Son, Ltd., 1935, 10s
- Imperial Economic Committee*—I.E.C./C./1:—Meat. A Summary of Figures of Production and Trade Relating to Beef, Mutton and Lamb, Bacon and Hams, Pork, Cattle, Sheep, Pigs, Canned Meat. (75 pp.) London: H.M. Stationery Office, 1935, 1s.
- The Co-operative Union.*—Co-operation. A Survey of the History, Principles and Organization of the Co-operative Movement in Great Britain and Ireland, by *F. Hall* and *W. P. Watkins*. (408 pp.) Manchester, 1934, 7s 6d.

Pests and Diseases

- Imperial Bureau of Agricultural Parasitology*—The Pathology and Aetiology of Plant Lesions caused by Parasitic Nematodes, by *T. Goodey*. (34 pp.) St. Albans, 1935, 5s.
- Imperial Bureau of Agricultural Parasitology.*—The Bearing of the Physiology of Parasitic Nematodes on their Treatment and Control, by *G. Lapage*. (21 pp.) St. Albans, 1935, 3s.
- O'Brien, D. G. and Dennis, R. W. G.*—Seed-Borne Diseases of Cereals. Their Identification and Control. (21 pp.) Manchester: British Dyestuffs Corporation, 1935, 1s.
- British Mycological Society.*—Plant Pathology Committee. List of Common Names of British Plant Diseases. (95 pp.) (2nd Edition.) Cambridge at the University Press, 1934, 2s. 6d.
- Wardlaw, C. W.*—Diseases of the Banana and of the Manila Hemp Plant. (615 pp.) London: Macmillan & Co., 1935, 30s.

Crops and Fertilizers

- Midland Agricultural College.*—Farmers' Bulletin No. 1:—Potato Production Costs.—Early Potato Costs, 1932. (6 pp., mimeographed.) Sutton Bonington, 1932.
- Midland Agricultural College.*—Farmers' Bulletin No. 6:—Main Crop Potato Costs, 1933. (22 pp., mimeographed.) Sutton Bonington, 1933.
- Bowdidge, E.*—The Soya Bean. Its History, Cultivation (in England) and Uses. (xii + 83 pp. + 18 pl.) Oxford at the University Press; London: Humphrey Milford, 1935, 6s.
- United States Department of Agriculture.*—Miscellaneous Publication No. 200:—Manual of the Grasses of the United States by *A. S. Hitchcock*. (1,040 pp.) Washington, 1935, \$1.75.

ADDITIONS TO THE LIBRARY

- ✓ *Barker, A. S.*—The Use of Fertilizers. A Guide to the Manuring of Crops in Great Britain, with foreword by Professor J. A. Scott Watson. (204 pp.) Oxford, at the University Press; London. Humphrey Milford, 1935, 7s. 6d.

Horticulture

- Wright, R.*—The Story of Gardening—from the Hanging Gardens of Babylon to the Hanging Gardens of New York. x + 475 pp. + 33 plates.) London: G. Routledge & Sons, 1934, 15s.
Shearn, W. B. (Editor).—The Practical Fruiterer and Florist. A Complete Guide on all matters relating to the Retail Fruit, Flower and Vegetable Trades. 3 vols. (Vol. I: xii + 256 pp. + 16 pl.; Vol. II: viii + 256 pp. + 13 pl.; Vol. III: viii + 256 pp. + 14 pl.) London: George Newnes, 1935, 42s. 6d.
Harrison, A. T.—How We Made Our Garden. (viii + 182 pp. + 16 pl.) London: A. Maclehose & Co., 1935, 5s.
Sweet, A. J.—Ornamental Shrubs and Trees. Their Selection and Pruning. (64 pp. + 1 pl.) London. Dent, 1935, 5s.
France, Les Chemins de Fer de l'Etat.—Les fruits qui payent. Rapport de mission d'études pomologiques en Angleterre, Sept., 1934. (23 pp.) Rouen.
Beckett, E.—Vegetables for Home and Exhibition. (420 pp.) London. Simpkin, Marshall. Revised 1927, 7s. 6d.
Vercier, M. and J.—L'Asperge. (134 pp.) Paris: J. B. Baillière et Fils, 1935, 12 fr.
Lebl, M.—Die Champagnonzucht. (10 Auflage.) Herausgegeben von G. U. Langer. (112 pp.) Berlin: Paul Parey, 1934, R.M. 2 80
Bowles, E. A.—A Handbook of Narcissus. (248 pp. + 24 pl.) London: Martin Hopkinson, 1934, 12s. 6d.
Wheelwright, E. G.—The Physick Garden. Medicinal Plants and their History. (288 pp. + 17 pl.) London: Jonathan Cape, 1934, 10s. 6d.

Live Stock and Feeding

- Lauridsen, L.*—Svinchold og Svinefodring. (4th Edition.) (139 pp.) Published by the Author at Graasten Landbrugs-skole, 1933.
Layley, G. W. and Malden, W. J.—The Evolution of the British Pig, Past, Present and Future. (xvi + 119 pp. + 26 plates.) London: John Bale, Sons and Danielsson, 1935, 7s.
Legendre, G.—L'élevage du porc en plein air. (125 pp.) Paris: Librairie Agricole et Horticole de la Maison Rustique, 1935, 6 fr.
Troupeau-Housey, J.—Moutons et porcs d'herbage. (171 pp.) Paris: Librairie Agricole et Horticole de la Maison Rustique, 1934, 7-70 fr.
South-Eastern Agricultural College, Wye—Department of Economics, Report No. XXI. Financial Results on the College Farms V. Sheep Breeding and Feeding over Four Years, 1930-31 to 1933-34, by J. Wyllie and N. V. Hewison. (pp. 159-197.) Wye, 1935, 2s.
War Office. Army Council.—Report on the Census of Horses in Great Britain, 1934. (37 pp.) London: H.M. Stationery Office, 1935, 1s. 3d.
Cornie, F. E.—Iodine for Live Stock. (32 pp. + 7 pl.) London: Nitrate Corporation of Chile, 1935.
Schmid, A.—Nutztierzüchtung und Kulturrassen der Schweiz. (76 pp. + map + 24 pl.) Frauenfeld und Leipzig: Huber & Co., 1934.

ADDITIONS TO THE LIBRARY

Small Live Stock

- Hicks, J. S. (Editor).*—The Encyclopædia of Poultry. 2 vols. (662 pp. + 8 pl.) London: Waverley Book Co., 1935, 35s.
Brown, E. T.—The Poultry-Keeper's Text-Book. (2nd Edition.) (320 pp. + 62 pl. + 4 plans.) London: Ward, Lock & Co., 1934, 6s.
Imperial Bureau of Animal Nutrition.—Technical Communication No. 5:—Recent Research in Poultry Nutrition, A. R. G. Emslie. (58 pp.) Aberdeen, 1934, 1s.
Atkins, F. C.—Poultry Farming Without Capital. (72 pp.) Published by the Author from Red Comb Egg Farm, Hermitage, Newbury, Berks, 1932, 1s.
Williams, C. T.—Modern Fur Farming. (105 pp + 8 pl.) London: Cassell, 1934, 1s. 6d.

Dairying, etc.

- Associates of L. A. Rogers.*—Fundamentals of Dairy Science (616 pp. + 1 pl.) (2nd Edition.) (American Chemical Society, Monograph Series.) New York: Reinhold Publishing Corporation, 1935, \$6.
Rennes, J.—Production—commerce et contrôle hygiénique du lait. (238 pp.) Paris: Vigot Frères, 1933, 25 fr.
Institut International d'Agriculture.—Le contrôle des vaches laitières dans le monde. (viii + 199 pp.) Rome, 1935, 20 liras.
New Zealand—Report of the Dairy Industry Commission. (H.—30.) (207 pp.) Wellington, 1934
Prentice, E. P.—Breeding Profitable Dairy Cattle. (xviii + 261 pp. + 9 pl.) Boston and New York: Houghton Mifflin Co., 1935, \$2.50.
Ministry of Health.—Reports on Public Health and Medical Subjects No. 77.—The Supervision of Milk Pasteurizing Plants, by Sir Weldon Dalrymple-Champneys. (47 pp.) London: H.M. Stationery Office, 1935, 1s. 3d
Midland Agricultural College.—Farmers' Bulletin No. 4:—Management for Milk Production. (17 pp., mimeographed.) Sutton Bonington, 1933.
Midland Agricultural College.—Farmers' Bulletin No. 7:—Some Aspects of Herd Management for Milk Production, 1933-34. (40 pp., mimeographed.) Sutton Bonington, 1934.

Veterinary Science

- Black's Veterinary Dictionary.*—Edited by W. C. Miller. (2nd Edition.) (1,150 pp. + 8 pl.) London: Black, 1935, 21s.
Hayes, M. H.—Veterinary Notes for Horse Owners. An Illustrated Manual of Horse Medicine and Surgery written in Popular Language. (12th Edition.) (xxiv + 833 pp.) London: Hurst and Blackett, 1934, 20s.
Cameron, T. W. M.—The Internal Parasites of Domestic Animals. A Manual for Veterinary Surgeons. (xii + 292 pp. + 17 pl.) London: Black, 1934, 15s.

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XLII No. 9 December, 1935

NOTES FOR THE MONTH

Conference on Malting Barley at Rothamsted

WHAT constitutes a good sample of malting barley, and what are the circumstances within our control that favour the production of such a sample? These were the questions discussed at a Conference of barley growers, buyers and maltsters held at Rothamsted on November 6. The procedure was similar to that found so successful a year ago at the first meeting of its kind to be held at the Experimental Station. Barley growers from all parts of the country sent in samples accompanied by full details of the conditions under which they were grown. The barleys were carefully graded by a committee of expert buyers, and every sample was afterwards displayed with its full agricultural history. This was the raw material of the Conference, and it formed the basis of a very free and helpful discussion between the members of the barley trade and the producers of malting barley.

In his opening remarks, the Chairman, The Rt. Hon. The Earl of Stradbroke, K.C.M.G., referred to the decline in the barley acreage during the last 15 years, and stressed the need of increasing the consumption of home-grown barley. To do this, farmers, like everyone else, must produce an article that meets the requirements of their customers. The meeting would be of great value in providing first-hand information regarding these requirements.

Sir John Russell, speaking of the importance of quality in barley, showed how the work carried out in the past 10 years, under the Research Scheme of the Institute of Brewing, and still in progress, was gradually introducing precision into a subject that has hitherto been intangible and

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obscure. The results so far obtained were already being applied in the industry.

The method of grading was then explained by Mr. H. M. Lancaster. The committee assigned each barley to one of seven grades on the basis of an agreed market value. The price basis was the only feasible one for so large a range of samples, but Mr. Lancaster pointed out that a single barley might have different prices for different purchasers, each viewing the material in relation to his own special requirements. It was still doubtful whether market value was always a true index of intrinsic value. Some buyers paid great attention to external characteristics; others had more faith in analytical figures. Of the points that were certainly important in the eyes of buyers, he placed (1) Condition, as judged by feel and smell, and the absence of grown or heated corns; germination should be practically perfect. (2) Careful threshing, for close threshing leads to mouldiness on malting. (3) Ripeness, indicated by a well-filled corn and crinkled skin; lean, tight-skinned grains were not wanted. (4) On the question of the cross-section of the barley grain, Mr. Lancaster expressed some doubt. Everyone, he said, carries a cutter, but it was possible that some of the flinty samples might be dealt with rather harshly if judged entirely on this test.

Attention then turned to the 270 samples set out for inspection. The grading gave the following results; the figures for the previous conference are set out below for comparison.

<i>Number of Sample in each Grade as per cent. of Total.</i>							
<i>Grade.</i>	<i>1934.</i>				<i>1935.</i>		
I	2.6	..	..	..	0.7		
II	2.1	..	..	..	4.4		
III	7.4	.	..	..	13.7		
IV	11.6	..	..	..	21.1		
V	27.0	..	..	.	31.2		
VI	35.0	..	.	..	22.3		
VII (grinding) ..	14.3	..	..	..	6.6		

It is clear that the bulk of the barleys, as represented by the samples, fall into the lower grades. Those in the top grade are the outcome of a favourable conjunction of circumstances, and cannot be produced to order. From an analysis of the agricultural data, Sir John Russell indicated some of the factors that tended to be associated with the better samples. Autumn sowing, when winter conditions were not too severe, gave some very good samples; when

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spring sowing was practised, the early sowing in February or the first week in March was on the whole the most successful. On the average the medium soils gave better samples than the very light or heavy ones. Light soils in particular gave poor results in the droughty summer of 1935.

The field information relating to the samples, which represented about $\frac{1}{3}$ of 1 per cent. of the barley acreage, gave a useful indication as to how the barley crop is actually handled in England, and a brief summary was presented by Mr. H. V. Garner. The figures showed the predominance of Spratt Archer in Norfolk, for 75 out of 104 samples were of this variety; in this county also sugar-beet was by far the most important crop grown before barley. Elsewhere Plumage Archer and Spratt Archer were about equally common, and each of these exceeded all the other varieties combined. Barley after corn was the most common sequence. About 60 per cent. of all samples were manured in some way, and of them nearly 80 per cent. received nitrogenous manure. Even when the land was in good heart, as judged by its previous treatment, about 60 samples, or 22 per cent. of the total, received some form of direct nitrogenous manuring. This occurred in the higher grades, so that generous treatment does not necessarily mean low quality.

In the general discussion that followed many interesting points were raised. Farmers were anxious to have a statement from the brewers as to the necessity for the use of Californian barley. It appeared that this type of barley was a very safe brewing material and enables a considerable proportion of lower-grade English barley to be used.

Several speakers found fault with the performance of threshing machines on the ground that the grading of the head corn was bad and damage to the grain too frequent. Dr. H. J. Denham of the Institute for Research in Agricultural Machinery, Oxford, pointed out that threshing machines capable of meeting the exacting claims of barley growers would only be forthcoming if an effective demand arose. Satisfactory winnowing machinery already existed in the grain trade. Nitrogen content of the grain as an index of quality was taken up by several speakers and Dr. Denham suggested that the possibilities of a system of barley marketing based on nitrogen content and germination might be examined. Samples of Spratt Archer barleys grown in

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Norfolk, and displayed at the Conference, had been determined for nitrogen and the results showed a fairly good agreement between nitrogen content and the grading; the higher the grade the lower the nitrogen.

<i>Nitrogen Content as per cent. of Dry Barley.</i>							
<i>Individual Values.</i>							
Grade	I	..	1.28				Mean.
	II	..	1.31	1.38	1.32	1.32	1.28
	III	..	1.48	1.48	1.40	1.28	1.41
	IV	..	1.30	1.47	1.46	1.42	1.43
	V		1.46	1.35	1.54	1.42	1.46
	VI	.	1.46	1.72	1.47	1.53	1.47
	VII	.	1.52	1.43	1.62	1.54	1.53

Barley growers set out the points they aimed at in the production of high-class barley, and the remarks of Capt. Irvine Friend, a grower of Grade I barleys for both of the Rothamsted Conferences, were of special interest. Deep cultivation and a firm seed bed were important. Barley should be allowed to stand till it was dead ripe and then stacked under the Dutch barn as soon as possible.

The inspection of the samples was a great success; and what was learnt in the informal discussions that took place round the tables would doubtless be the most enduring part of the Conference.

Milk Science in Schools

THE Departments of Agriculture and Preventive Medicine of the University of Bristol have recently conducted a course of instruction, including lectures, demonstrations, farm and city dairy visits in connexion with milk science in schools.

It was considered that the most practicable approach to the school children was via the science teachers, and therefore the teachers in the City of Bristol were invited to attend the above course at the University.

The course was taken by 130 teachers, representing 80 schools, and the syllabus consisted of elementary milk biology, modern methods of milk production, handling and transport, the nature, properties and value of milk and milk products, and the care of milk in the home.

Following the course, talks were given in the schools by the teachers after which the children were invited to write an essay, or print a poster on the subject, prizes being awarded.

Owing to the great number and high standard of papers

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submitted to the University for final judgment, the number of prizes awarded was increased from three to nineteen. From a study of the essays it was evident that the essential points of the subject were fully grasped by the children, and it is felt that more intensive educational work could usefully be conducted along the same lines.

The Education Authority of Bristol co-operated wholeheartedly in the scheme, and it was only by its valued assistance that this extensive course was rendered possible.

Mutton and Lamb Survey

ALL the more important facts relating to the world trade in mutton and lamb during the past decade are brought together in the admirable survey* issued by the Imperial Economic Committee. On the whole, it makes brighter reading than the earlier report on cattle and beef. The general outlook for mutton and lamb appears to be better than for beef, mainly because the expansionist tendencies in production are counter-balanced by an increasing demand in this country.

The world trade in mutton and lamb is monopolized by a few countries. The exporting trade is dominated by New Zealand, Australia and Argentina, which together account for over 90 per cent. of the total export trade. The United Kingdom is practically the sole market, inasmuch as some 95 per cent. of the total exports are consigned to this country. Total world trade has increased considerably since 1924. It reached its peak in 1931 when total exports amounted to 378,000 tons, or 42 per cent. more than in 1924; and, although the total has since declined, it was still, in 1934, some 24 per cent. greater than in 1924. Empire supplies continued to increase during the whole of the period, and in 1934 represented 79 per cent. of the total, whereas, in 1924, the proportion was 55 per cent.

Production in the principal exporting and importing countries has increased during the past decade. Among the exporting countries the most marked increase has taken place in Australia, while in the United Kingdom production has increased by some 25 per cent. since 1924.

* Mutton and Lamb Survey. a Summary of Production and Trade in the Empire and Foreign Countries. Prepared by the Intelligence Branch of the Imperial Economic Committee. Obtainable through any bookseller; or direct from H.M. Stationery Office at the addresses given on the cover of this JOURNAL, price 4s., post free 4s. 6d.

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Another important aspect of world trade has been the change-over from mutton to lamb. Judging from the United Kingdom figures the share of lamb in the total has increased from less than half in 1924 to about three-quarters in 1934. This change in consumption represents part of a wider movement in consumer demand to lighter and more valuable foods. On the production side it has resulted in changes in the constitution of flocks and in the development of specialist fat lamb production.

Notwithstanding the upward trend in total supplies and *per capita* consumption in the United Kingdom since 1924, for the greater part of this period prices fell proportionately less than beef, and compared with a pre-war base mutton prices maintained a favourable ratio to wholesale prices generally.

The increase in total supplies in 1931 and 1932 combined with other factors, including the decline in purchasing power consequent upon trade depression, brought about a sharp fall in prices, but the market recovered in 1933 and 1934 under the influence of restricted imports and, possibly, some revival of purchasing power.

Young Farmers' Clubs : Annual Cattle and Poultry Judging Competitions

Cattle Judging.—The national dairy cow judging contest organized annually by the National Federation of Young Farmers' Clubs was held at the Dairy Show in London on October 22-24. Teams of two from 22 counties took part in the preliminary contests on the first and second days, and from them eight teams and eight additional individual competitors were selected to participate in the final contest on the third day.

This year competitors in both the preliminary and final contests were required to judge four rings of cattle each consisting of four animals of one of the following breeds: Dairy Shorthorn, Red Poll, British Friesian, Ayrshire, Guernsey and Jersey.

The "Farmer and Stockbreeder" Silver Challenge Cup and Silver Medals provided by the National Federation were won by the team representing Durham. Bronze Medals were awarded to the Surrey team, which was a close second. The British Dairy Farmers' Association again offered one silver and two bronze medals for the

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leading individual competitors. It is worthy of note that this year's individual champion is a brother of the 1933 joint champion (J. L. Thomas) and the 1934 champion (Betty Thomas).

Details of the scores of the most successful teams and individual competitors are as follows:—

CATTLE JUDGING: PRELIMINARY CONTESTS

<i>Section A.</i>		<i>Points.</i>	<i>Section B.</i>		<i>Points.</i>
		Maximum 720.			Maximum 720.
1st	Hampshire	580	1st	Northumberland	574
2nd	West Sussex	556	2nd	Yorks, North Riding	569
3rd	Bucks	542	3rd	Durham	541
4th	Surrey	538	4th	Somerset	527

CATTLE JUDGING: FINAL CONTEST

<i>Teams.</i>		<i>Points.</i>	<i>Individual Competitors.</i>		<i>Points.</i>
		Maximum 720.			Maximum 360.
1st	Durham	596	1st	W. R. Thomas	
2nd	Surrey	586		(Surrey)	318
3rd	Northumberland	568	2nd	J. C. Atkinson	
4th	Bucks	552		(Durham)	302
			3rd	T. H. Vickers	
				(Durham)	294
			4th	E. Christopher	
				(Northumberland)	291

The Challenge Cup and Medals were presented by the President of the British Dairy Farmers' Association, Lord Rowallan.

Thanks are due to the judges, Mr. Walter Burrell, Mr. J. H. Faulder, Mr. Robert Hobbs, Mr. H. G. Robinson and Professor J. A. Scott Watson, for the manner in which they carried out their duties. Their explanations of the points which they had taken into consideration in placing the animals were much appreciated by the competitors and spectators.

Poultry Judging.—The annual poultry judging competition was held on the fourth day of the Dairy Show, seven teams of three competing for the Silver Challenge Cup presented by Dr. Bernard Bailey. The competitors were required to judge four breeds, viz.: Rhode Island Red, White Wyandotte, White Leghorn and Light Sussex.

The Cup was won by the Chiddingfold Club for the second year in succession with a score of 817 points out of a maximum of 1,080. Silver and bronze medals were again awarded by the British Dairy Farmers' Association to the most successful individual competitors.

The final placings of teams and leading individual competitors are given overleaf.

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POULTRY JUDGING

<i>Teams</i>		<i>Points.</i>	<i>Individual Competitors. Points.</i>	
		Maximum 1,080.		Maximum 360.
1st	Chiddingfold ..	817	1st	Anthony Munlay
2nd	Farrington Gurney ..	754		(Sevenoaks Weald) 287
3rd	Ringmer ..	706	2nd	Enid Carn (Chid-
4th	Croft ..	702		dingfold) .. 281
			3rd	W. G. Weller (Chid-
				dingfold) .. 270
			4th	Helen Carn (Chid-
				dingfold) .. 266

The judges were Mr. H. Howes and Mr. A. F. Tomey.

At the conclusion of the contest the Cup and Medals were presented to the successful competitors by Miss Bailey.

Cereal Synonyms

THE following note has been contributed by the Director of the National Institute of Agricultural Botany:—

The Cereal Synonym Committee, appointed by the Royal Agricultural Society of England, the National Farmers' Union, the Agricultural Seed Trade Association, the National Association of Corn and Agricultural Merchants, the Cambridge University Plant Breeding Institute, and the National Institute of Agricultural Botany, have come to the following decisions on the stocks of cereals which they examined in 1935.

In arriving at their decisions the Committee were guided by the following definition of a cereal synonym:—

“ The Cereal Synonym Committee regard two cereals as synonymous when they present precisely similar morphological characters, and when they also possess identical physiological characters in so far as they can be determined. Even then by this term they do not necessarily imply that these two varieties are of identical origin, though doubtless in the majority of instances they are. The possibility of two cereals of different parentage presenting such a close, if not complete, similarity as to mask their individuality has not been lost sight of. But the Committee have to deal with facts as they are; they, therefore, regard as synonymous all cereals which are identical in the sense used above, even when they know that the origins are different.

Note.—Before the Committee come to a conclusion concerning the synonymy of any variety the breeder and/or the introducer is given an opportunity of demonstrating to the Committee such differences as he may claim to exist between his variety and the type variety.”

Using the term “ synonym ” in the above sense the Committee are of the opinion that the names listed below in the left hand column are synonyms of those in the right hand column.

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WHEAT

Harold Sadd's Seeds, Ltd.'s (Ipswich) **Standfast Yelder** is a slightly impure stock of **Bacton Masterpiece**.

OATS

Edward Webb & Sons (Stourbridge), Ltd.'s } **Ascot (1935 stock)** is a synonym of **Record**.
John Swain, Ltd.'s (Bristol) } **January White Oat** „ „ **Victory**

This oat is claimed to be a hardy selection from **Victory**. The Committee have given particular attention to hardiness, but are unable to confirm the claim that **January White** is superior to **Victory** in this respect.

BARLEY

Herbert Parker, Ltd.'s (Norwich) **Norfolk Malting** is a synonym of **Spratt-Archer**.

Many of the names reported by the Committee in previous years as synonyms have now been abandoned. The names given below, however, were still in use in 1935; the distinct varieties of which they were found to be synonyms when examined by the Committee are given in each instance:—

WHEAT

James Carter & Co's	Corn in Egypt was a synonym of Setter
„ „ „	Red Standup „ „ Squarehead's Master.
Toogood & Sons'	Squarehead's Success „ Squarehead's Master.
Edward Webb & Sons (Stourbridge), Ltd.'s }	Standard Red „ „ Squarehead's Master.
„ „ „	Standup White „ „ Wilhelmina.
Herbert Parker, Ltd.'s	Viking „ „ Wilhelmina.
A. G. Leighton, Ltd.'s	Twenty-One „ „ Weibull's Standard.
James Carter & Co's	Yeoman King „ „ Yeoman
„ „ „	Red Admiral „ „ Japhet or Red Marvel.

OATS

Herbert Parker, Ltd.'s	Norfolk Emperor was a synonym of Abundance .
„ „ „	Norfolk Wonder „ „ „
„ „ „	Norfolk Yelder „ „ „
Edward Webb & Sons (Stourbridge), Ltd.'s }	Newmarket „ „ „
Herbert Parker, Ltd.'s	Profusion „ „ Marvellous.
„ „ „	Profusion Winter Oat „ „ „
James Carter & Co.'s	Giant Black Cluster was predominantly Bountiful with some Black Winter .
„ „ „	Giant Black Winter was predominantly Black Winter with some Bountiful .
„ „ „	Quite Content was a synonym of Victory .
Edward Webb & Sons (Stourbridge), Ltd.'s }	White Horse „ „ „

Note.—Though the spring stock of **Parker's Profusion** examined was a synonym of **Marvellous**, evidence was laid before the Committee that **Profusion** had previously been a synonym of **Superb**.

BARLEY

Herbert Parker, Ltd.'s **Fortyfold** was a synonym of **Spratt-Archer**.

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Report of the Flowers and Plants Publicity Committee

IN February, 1934, the Minister of Agriculture and Fisheries appointed a Committee, under the chairmanship of Sir Lionel Earle, G.C.V.O., K.C.B., to advise on the conduct of a temporary scheme of publicity for British flowers and plants, pending the setting up by the industry of a body to assume responsibility for the work. The appointment of this Committee terminated on October 31 and the Committee have now presented their Report. The document gives a detailed account of the Committee's activities, which included the establishment of the British rose garden and a British flowering shrub and tree garden in Regent's Park (Queen Mary's Gardens), and the organization of displays of British bulbs in the principal London parks and gardens. They have also invited local authorities to consider the desirability of using British plants, shrubs and bulbs for display in the parks and gardens under their control. The Committee report a gratifying response from the bodies concerned.

Further publicity was given to British bulbs and flowering plants by means of tours arranged with the co-operation of the London and North Eastern Railway Company to view the Lincolnshire bulb fields when in flower, and by posters designed to advertise the bulb fields and other floral displays, and exhibited by the various railway companies.

The Committee also arranged for the decoration of certain Government offices with window boxes during the Silver Jubilee celebrations, and express the view that, as a result, the use of window boxes is likely to increase.

Arrangements were made for a number of broadcast talks on horticultural subjects, and a very considerable amount of publicity was obtained in the press. On the advice of the Committee, the Ministry issued guides to Queen Mary's Gardens, leaflets dealing with home-grown cut flowers, the Lincolnshire bulb industry and window-box displays, and lists of commercial varieties of bulbs grown in this country and of wholesale and retail distributors.

The Committee indicate that their work will be carried on by a body nominated by the various sections of the industry, and that publicity for home-grown vegetables will be included. The new body will be known as the Flowers, Plants and Vegetables Publicity Committee, with headquarters at 68, Victoria Street, London, S.W.1.

MUSTERING AND THE MUSTERERS

A. EWING REID,

Southport, Queensland, Australia.

EVERY day, on a thousand stations throughout Australia, stock are being mustered—cattle for branding, drafting or other purpose, and sheep for shearing, earmarking and other treatment.

On the larger holdings, it is impossible for stock to get accustomed to man, whom they may only see once a year at the annual muster. They are therefore wild or “man shy,” and mustering entails for them a certain amount of “knocking about.” In these circumstances, mustering is kept at a minimum. Yet, on some of the large cattle stations, mustering continues throughout the year: the muster camp moving from point to point over the run. Sheep, on the other hand, are generally all mustered at one time within the short period of the annual shearing.

Down on the flat by the creek, the trunks of the giant gums reflect the flickering glow of the dying camp fire. Beyond, the world is black and silent, and up above the star-peppered sky looks cold and steely.

A log slips among the embers, a chain of sparks leaps up and floats slowly away on the motionless air, and in the momentary blaze the whole muster camp is painted in a flood of gold. There the musterers lie asleep on the ground, grouped round the fire like spokes in a wheel; the curled-up sleeping cattle dogs lie on the rim beyond; and, tied to a nearby tree, the patient night horse stares with wondering eyes at the fire. From far away in the distant darkness, where the stars hang low, is faintly wafted the slow plaintive tinkle of the horse bells.

Long before the first glimmer in the east heralds the new day, the cook has risen, stirred the fire into a warm blaze, and commenced to prepare breakfast. Then another sleeper sits up, yawns, stretches himself, puts on his hat, throws back his blankets, pulls on his boots, and—being now fully dressed—rises and squats down as near the fire as possible and holds his hands to the blaze. He then lifts his saddle and blanket, saddles the night horse and rides slowly out into the dark towards the sound of the horse bells. He is the “horse tailer,” his job being to bring in the

MUSTERING AND THE MUSTERERS

musterers' horses. He rides beyond and round the horses, and as a certain number of the horses are hobbled to prevent them straying beyond a point where their bells would fail to be heard, he dismounts and unstraps the hobble on one leg of each hobbled horse. Then mounting, he lets loose a volley of pistol shots from his stock whip and drives the horses with a thunder of hoofs and a merry clatter of bells and rattle of hobble chains to the camp, where a yard of some sort has been knocked up. By the time the horses are yarded, the camp is astir.

Each musterer, having put on his hat and pulled on his boots, washes if water is available, then seizes his plate and a quart pot, goes to the cook's table and helps himself to breakfast, with which he returns to the fire to eat. Breakfast generally consists of corned meat, damper and tea. Of course Awards specify butter, jam, tomato sauce, etc., but the real cattle man pays scant attention to those products of a Government-ridden age. Breakfast eaten, the musterer then cuts himself a lunch, usually a slice of corned meat, a slice of damper, and perhaps a slice of brownie (currant cake). These he wraps in paper, fills his little cotton bags with tea and sugar, and puts the lot in his saddle pouch. This, with his quart pot, he then ties on his saddle. Each musterer then picks up his saddle and bridle and goes to the yard, where with others in a cloud of dust, and among thirty or forty snorting horses, he catches his mount for that day and saddles up. It is at this hour, when mounting in the morning, that the unrehearsed buck-jumping exhibitions are seen. The fresh horse, the cold saddle, and the crowd! There goes Bill, his hat in the air, his saddle pouch and quart pot flapping, tearing away through the timber on a flying, bucking youngster. Back he comes at a canter, a grin on his reddened face and the youngster a bit blown, wild of eye and red of nostril, and right for the day.

So the musterers, generally in pairs, ride out into the sunlight on to their job, at that hour of the awakening day that Will H. Ogilvie has described in the following lines:—

Have you heard the Wagtail chirrup,
Felt the dawn wind blowing cold,
And your foot was in the stirrup,
And the whole world turned to gold.

While the Australian stockman sports none of the trappings of the American cowboy, he is, nevertheless, a picturesque figure and a distinct type. His clean lines and his absence of adventitious trappings are characteristic—a

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man and a horse. He may carry a stockwhip—nothing else. He is generally tall, straight, lean and wiry, bronzed of face and neck, narrow-hipped and small of waist, long and thin of leg, and small footed. He conforms to a general standard of attire: a small felt hat—the very opposite of the “ten gallon” or Tom Mix type; a shirt with open collar and two breast pockets, in one of which can be seen the outline of the Havelock tobacco tin in which he carries the “makins” for his cigarettes; the sleeves always rolled up above the elbow; trousers tight fitting, especially from the knee down, and of moleskin of a fawn or khaki colour; boots always with elastic sides, or laughing sides as he calls them; and his leggings, the short concertina legging reaching from below the calf of the leg to his boots. His spurs are small and hung low on his heel—in fact they drag on the ground when he walks. His clothes seem to fit close on his body. He works hard in dry and sometimes very hot conditions, and although his clothes seem to make no concession to coolness the conventional rig-out persists.

A bit with a curb is never seen. The saddle has two knee-pads, sometimes four inches high, running from the top to just clear of his knee, and two smaller and shorter pads behind. He rides with a very long stirrup and nearly a straight leg. His stockwhip, with which he can keep up a run of cracks like pistol shots while galloping round a racing beast, is simply a means of frightening the stock into taking the direction desired or for driving them along. The stockwhip, however, with a handle about two feet long and a thong up to 30 feet, generally of pleated kangaroo hide, is a weapon of great precision and power. Precision is demonstrated by feats such as picking up a threepenny bit at 20 feet with a flick of the whip, or flicking off the ash of a cigarette in a smoker's mouth. Lady Goodwin, wife of the last Governor of Queensland, at a charity fête showed no fear in letting a stockwhip expert crack the whip in such a way that the end of the 30-foot thong slowly finished round her neck. The power lies in the pistol-like cracks and the severe punishment that can be inflicted with the whip. The stockmen sum up both the power and precision by saying: “Why, Bill can cut his brand with his whip on a racing beast.”

In place of the lasso, the Australian stockman throws his beast by hand while riding. This is done by his galloping alongside the beast, gripping its tail—generally

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carried erect—and, at the right time, swinging the beast when its hind feet are off the ground, so that it immediately falls. The stockman's horse stops dead, the stockman dismounts, sits on the beast's head and ties its legs. In trials, in competition with American cowboys using the lasso, the Australian stockmen were able to tie their beasts in less time than the cowboys, and the Australian method is less severe on the animals.

The methods of mustering vary in a hundred ways, the method being decided by such factors as the occurrence of "water," visibility, the topography of the land, and the class and condition of the stock. Some of the "paddocks," quite unfenced, are of enormous area, much larger than any English county: one station has an area greater than Belgium. Because of hills or timber, the ability of wild stock to avoid man, and the large areas, it is not practicable to comb or "beat" the country. Mustering, therefore, is mostly a question of knowing your country, a knowledge of the habits of the stock, and, particularly, where the drinking water occurs. All stock must drink daily or at longer periods. They may drink any time during the day or night. When feed is good or the weather very hot, they may graze slowly in towards the water, drink slowly, stand in the water for a time, and then retire to the nearest shade to camp for hours. On the other hand, if disturbed and restless, in very cold weather or when their feed is miles away, they may glide quickly and noiselessly into the water, gulp a drink, swing round in their tracks, and equally quickly, silently and purposely flit away. The musterer knowing the waterholes hopes to catch his stock there. If unsuccessful there, he may ride to their feeding grounds or elsewhere as the tell-tale tracks reveal to him. At every watering place, along every cattle pad he rides, he reads the signs of the tracks. The hoof marks left by stock are a clearly-typed story to the good bushmen. A few tracks in the dust, and the good tracker can tell the approximate number, the age and sex of the stock, and how long since they passed.

Daily, each pair of musterers bring their stock to a pre-arranged rendezvous. If a yard is available, the result of the day's mustering is held there, if not then they are held and watched all night. It means stockmen riding round the mob all night. Fires are generally lit on the sides where straying or rushing is most likely, and the stockmen sing

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to the cattle. The human voice has a soothing effect on stock, but whether in proportion to its quality is not known. Records are not available as to whether jazz has the same unnerving effect on stock as on most humans! Next day, the mob, under the charge of two or three men, is allowed to spread out and graze and take a drink. The other musterers proceed as on the previous day, returning at sundown with more cattle to join the mob—and so the mustering proceeds daily until the paddock is clean.

In large paddocks, especially in timbered country and in cloudy weather, it is very easy to get "bushed"—or lost. Hundreds of square miles of country are exactly alike. The stockman steers his course entirely by the sun, or really by the shadows cast by the sun. Very seldom is a stockman bushed for any length of time: the cattle pads lead him to water or some known object.

Coincident with mustering, there is the stock drafting. This is the work of separating one class of stock from another, e.g., separating the males from females. In yards, this is simply done by driving the stock up a laneway permitting the passage of only one beast at a time. By means of a swing gate, one class can be diverted to the right and the other to the left and thus separated. Sheep are always drafted in yards, but cattle, where no yards exist, are drafted in the open by the method known as camp drafting. In this method, while the mob is held together by stockmen, riders go into the mob, pick their beast and gradually work it to the outside of the mob where other riders take charge of it. This camp drafting or "cutting out" calls for good horses and good riding, and is hard on man and horse.

There is a peculiar fascination about the life of the musterer: the dry, clear, sunny days—the nightly meeting with your fellows round the camp fire—the freedom of sleeping in the "open" away from the cramping and air-restricting "four walls"—the ever-present association with stock. Each and every day is spent in the saddle. The love of a man for a horse, who can explain it? That feeling of the fresh horse beneath you—the snatching rein—the champing bit—the forward spring—the wild exhilaration of those mad bursts of galloping, as with stockwhip cracking you crash through the timber after some beast making a dash for liberty—that slow canter that eats up the miles—or those long walks on the tired horse as you ride through the

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long shadows of the setting sun to the camp: how attractive it all is.

The characteristic country, whether of range or plain, whether in the green mantle of good season or the russet of dry, whether of vistas of boundless plain and sky or all-enclosing timber, is always of soft colours and soothing. By day all is golden, and by the shady waterhole the shadows are clear and black where the cattle stand belly deep in water, motionless, with eyes closed, asleep. By night the land is a thing of black and silver. In the clear air the moon and stars shine with a particular brilliance, and stand right out from their background as if there was as much space behind them as in front.

During the day, the land is silent except for man-made sounds, and at night only the monotonous "mo poke" of the owl, the wail of the curlew, or the hair-raising howl—like the cry of a lost soul—of the dingo, disturb the solitude.

Little animal life, and only that capable of travelling long distances, occurs in these areas: e.g., the kangaroo, often in mobs of fifty, and the emu, solitary or in pairs, and occasionally accompanied by a brood of a dozen little chicks gay in their circular stripes of alternate black and yellow.

Then there is that perfect evening hour when, having eaten, you lie relaxing on your swag, pleasantly warmed by the camp fire. Grouped round the fire in a circle, in the reflection of the dancing flames, you see the faces of your mates, and hear in goodwill the gossip of to-day and tales of yesterday. The talk, from being general, dies down to that of one or two, then fades away, and in peace and content, your couch the earth, and in that wall-less house whose ceiling is the everlasting stars, you rest

SPRAYING

J. TURNBULL,

Ministry of Agriculture and Fisheries.

THE end towards which all the operations of the progressive apple grower are directed is the production year by year of good crops of clean, sound fruit. He is not concerned merely to produce in any year a bumper crop, but must aim at the production each year of as large a crop as his trees can safely bear, so that he may keep his employees regularly at work and ensure the provision of regular supplies of apples to his markets. He is forced to aim at the highest possible quality, in order to meet the public demand that is being steadily directed towards higher grade produce by the high standard of the foreign fruits and vegetables that come on to our markets.

The commercial quality and regularity of an apple crop are influenced by many factors, of which not least are pests and diseases that not only spoil the appearance of the fruit, but also lower the vitality of the trees, so that good and regular crops cannot be obtained. By a properly adapted programme of spraying, pests and diseases can be controlled; and in this article are discussed some recent developments in spraying technique and the main points to which a grower must give consideration in his planning of his spraying equipment.

The foundations of success in combating pests and diseases by means of sprays have been laid by the many research workers who have studied the life cycle of most of those pests and diseases, and have shown what materials can be used and at what times in order to keep them under control. This work is known to apple growers, as is that of the spraying engineers who have produced and continue to produce many types of machines and plant adapted for use in orchards of different kinds. Progress in the adoption of a proper spraying programme, however, has in many instances been delayed by the fact that, until recently, farmers generally have been quite unable to obtain on the farm anything like as good control as has been obtained on experimental plots. The reason is that the means that have proved quite satisfactory to provide the trees with a complete spray cover under the conditions of a small-scale

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experiment have proved too difficult and laborious on the farm.

The whole problem of finding the most suitable means of actual application of spray fluids is a matter that will in due course be dealt with scientifically as the fundamental research begun at Oxford University and at Wye College proceeds. Meanwhile, empirical methods of inquiry are being employed by research workers and by farmers themselves. In the last few years these methods have yielded results by showing the value of employing higher pressures with driving sprays that permit the use of shorter and more handy lances than those hitherto considered necessary. The new methods have been adopted by a large number of farmers, who are now obtaining just as good results as those obtained in experimental work.

In the past it was insisted that in order to cover the foliage it was necessary to use a fine misty spray, and that, in order to hit insects such as capsid bug or sawfly, it was necessary to direct the spray downwards into the blossom trusses. It was held that only in this way could thoroughness be achieved. This method of applying spray fluids, however, made it necessary to use a long lance—8-10 ft. for low trees and 15-20 ft. for high trees—which, while suitable enough for use over short periods, was much too heavy and unwieldy for the everyday and all-day use of the commercial fruit grower. It was the necessity of providing some tool more handy than the long lance that has very largely inspired the work that has led to the improved methods of to-day.

It was evident that if a shorter lance were to be introduced, it would not be possible to employ the type of spray hitherto held to be required. With the use of a shorter lance, it was found that a further throw of spray must be produced to cover the tops of the higher trees. Higher pressures were necessary for this purpose, but with the single nozzle the resultant spray was too narrow to enable satisfactory work to be done by the majority of men. Experiments were made with combinations of two or more nozzles, but most of the nozzles were not of a type that would produce a spray that would carry far enough; while those with which such a spray could be produced were open to several objections. High pressures gradually alter the adjustment; two such nozzles are too heavy; and the ordinary junction piece is easily broken, while there are too

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many joints from which leakage can occur. In the end a fixed double nozzle* was designed and perfected to produce and maintain without loss of adjustment a driving spray powerful enough to reach the tops of the higher trees and with spread enough to enable the work to be done in reasonable time. The question whether this type of spray would make possible as complete a spray cover as was previously obtained by other methods has been answered satisfactorily: it has been decided in commercial practice.

Spraying must not only be done thoroughly, it must also be done speedily. The importance of the time factor can, indeed, hardly be over-estimated. Not only is the amount of work that can be done by one man in a given time a matter of considerable moment, usually for obvious reasons, but the speed with which the whole spraying operation can be performed may make all the difference between its success or failure. Both mycologists and entomologists have shown that, in order to be successful, spraying must be done at a particular stage of growth. Some of these stages last for a very short time. In spraying for Apple Scab at the pink bud stage, or for Apple Sawfly at petal fall, it is a case of a few days only; and if the spraying is not completed within those few days, some of it will not be done at the right time, and this will result in a partial or even complete failure.

The new equipment, short lance and fixed double nozzle, used with high pressures, enables spraying operations to be carried through in far shorter time than with the older type of outfit.

A revolution is quietly taking place. It is for growers themselves to consider how best they can adapt their methods, and it may be of interest here to discuss certain of the more important factors involved.

The minimum pressure that will serve with the new equipment is 250 lb. per sq. in., but it is as well if a pressure of 400 lb. can be employed, especially for the larger trees. Experiments are, indeed, being carried out with pressures up to 600 lb. Such pressures may seem to be excessive,

* The specification was published in this JOURNAL, August, 1934. The nozzle has now been put on the market by at least two of the leading firms of spraying engineers. The spray from this nozzle is a good combination of width and length. It cannot be altered unless a different swirl plate is fitted. Rubber washers are used in the caps, so that they can be screwed on to make them leak-proof, and screwed off for cleaning purposes, using the fingers only.

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but considerable experience of spraying at 400 lb. has shown that a great saving of time and material has been effected. This method of spraying is so easy that it almost ensures that thorough spraying can be done even by inexperienced workers.

The use of high pressures and the need for increased output at the pump to maintain the output required with the fixed double nozzle makes it necessary carefully to ensure that a large enough pump is installed. In this connexion it must be borne in mind that for various reasons a pump cannot maintain its rated output without loss of pressure. It has been found that, owing to inefficiencies in the pump and to the need for an overflow, the actual output at the nozzles is from 10 to 30 per cent.—most frequently 30 per cent. below the rated output of the pump. Moreover, the nozzles are in practice shut off for about 30 per cent. of the working time. These two factors combine to reduce the effective output to about one-half the rated output.

There is, too, another cause of reduced output that is often not fully appreciated—the amount of time that spraying is not actually proceeding. It takes an hour to get operations started in the morning and half an hour to clear up at night. If an ordinary set of portable pipes is used, or if the outfit returns to the headland for refilling, spraying stops when the pipes are being moved or while refilling takes place. The time thus spent may amount to $2\frac{1}{2}$ to 3 hours in a $9\frac{1}{2}$ -hour day, though it can be reduced if extra equipment and extra labour can be made available. The loss of time would not, of course, occur where a complete system of underground pipes is installed.

With whatever system of spraying is in use it must be realized that even with the most careful management only from 5 to 6 hours actual spraying work can be done in the course of a $9\frac{1}{2}$ -hour working day, with another one or two hours for overtime.

All the above factors must be taken into account in the calculation of the size of pump necessary in any individual orchard, or for any particular spraying operation. Thus, if it takes 10,000 gal. to complete one spraying and the work must be done in four days, it will be necessary to put on 2,500 gal. per day. In order to do this, it will be necessary to spray at the rate of 400 to 300 gal. per hour according to the method of working. The rated capacity of the pump required to do this will be 800 or 600 gal. per hour, and the

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sizes of engine needed to pump these quantities at high pressure will be about 7-8 h.p. and 4-5 h.p. respectively.

The selection of the right pump is of fundamental importance to satisfactory spraying, but it is also essential that due consideration shall be given to the number of men who can be kept steadily at work with nozzles giving the highest convenient output. As has been emphasized in the latest edition of the Ministry's Bulletin No. 5 (Commercial Fruit Tree Spraying), the amount of spraying that a man can do depends upon the nozzle output. If this can be increased the number of men employed can be reduced, with a consequent improvement in the results obtained, since only the best men need be retained on the work. With the improved equipment discussed above a very considerable reduction in the number of men employed in the actual spraying operation can be effected. It has, indeed, been found that, even when small pumps worked by hand or low engine power are used, the number of nozzles can be reduced if larger discs are fitted. The better spray thus obtained makes the work much easier; and just as much work will be done by the fewer men employed. Highly skilled men who are quick workers can use an enormous nozzle output in suitable conditions, but such men do not stay long on the average farm, and it is necessary to consider how much the average farm labourer can use satisfactorily. With very little change in the ordinary equipment a man using a short lance can apply $1\frac{1}{2}$ gal. of spray fluid per minute for a light spray and from 2 to 3 gal. per minute for a medium heavy spray on dwarf trees. On larger trees he can, using a 6 to 10 ft. lance, apply 2 to 3 gal. per minute for a light spray. He cannot well use more, even for a medium heavy spray, unless he uses a 6 ft. lance with 250 lb. pressure or a 4 ft. lance with 400 lb. pressure. In the past the nozzle output normally used has been about $\frac{3}{4}$ gal. per minute for dwarf trees and $\frac{3}{4}$ to $1\frac{1}{4}$ gal. per minute for half standards. A man can, therefore, now use two or three times as much material and spray two or three times as many trees in the day. The work is also lighter, and not so fatiguing as when the older methods were employed.

The figures given above may be regarded as average figures only. The amount of material that can be applied in a given time must vary not only with the efficiency of the workers but with such circumstances as the size of the trees and their distance apart. The above facts will, how-

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ever, assist growers in their consideration of the most suitable spraying equipment and programme to be adopted under their own special conditions.

It must be pointed out that it is not always possible to estimate exactly what quantity of spraying material is necessary for the due completion of any particular spraying operation. It is generally sound policy to allow the workers latitude, and to rely on them to use only that amount of material needed in the circumstances to give a complete cover. There is a strong tendency to-day among farmers to use larger quantities of material in order to ensure thorough work. It has to be remembered that the strengths, especially of fungicides, have been based on the use of small quantities of liquid, so that, if larger quantities are used, it is desirable to reduce the strength in order to avoid the possibility of spray damage. Most of the serious damage caused by lime-sulphur, it may be maintained, occurs after blossoming. Many varieties of apples do not require spraying for Apple Scab after blossoming, provided that the pre-blossom work has been done properly. Only those varieties that are subject to late attacks of Scab, and are known to stand lime-sulphur, should be sprayed after blossoming, and then at a strength not exceeding 1 per cent.

There is no question that, if sufficient attention is given to the methods of spraying, and if care is exercised in post-blossom work, good crops of practically clean fruit can be grown.

LIVE-STOCK IMPROVEMENT SCHEME: REPORT FOR THE YEAR 1934-35—II*

Milk Recording.—Table XI sets out the number of members of Milk Recording Societies in each year since 1917-18, when societies were required to adopt a uniform year, together with the number of herds and cows recorded.

TABLE XI.

<i>Year ended October 1.</i>	<i>Societies</i>	<i>Members.</i>	<i>Herds.</i>	<i>Cows.</i>
1917-18	27	639	708	19,793
1918-19	38	1,191	1,332	37,880
1919-20	46	2,075	2,312	61,323
1920-21	52	3,328	3,664	97,903
1921-22	55	3,949	4,362	117,023
1922-23	55	4,365	4,767	127,151
1923-24	52	4,764	5,209	138,086
1924-25	50	5,081	5,516	148,905
1925-26	49	5,174	5,656	154,322
1926-27	51	5,166	5,650	156,847
1927-28	50	4,862	5,320	149,971
1928-29	50	4,616	5,065	144,812
1929-30	49	4,501	4,934	140,266
1930-31	49	4,412	4,836	137,866
1931-32	49	4,267	4,682	135,912
1932-33	49	4,187	4,598	135,902
1933-34	49	4,211	4,622	141,325

The membership of Milk Recording Societies in 1933-34 showed an increase over the year 1932-33, and thus makes a break in the series of declines in official recording which, commencing in 1926-27, continued for seven years. There is at present every indication that this increase in membership will be maintained next year. The increase, however, was not general in all parts of the country, Wales, in particular, showing a further decline. A comparison of 1933-34 with 1925-26 shows that the falling-off in recording in Wales has been much greater than in England, the reduction being about 45 per cent. in Wales as against about 17 per cent. in England.

The increase in membership over last year may be a sign that the financial stringency that has caused so many dairy farmers to resign from Milk Recording Societies in the past few years, and has rendered so difficult the recruitment of new members, is not now so serious.

Average Yield of Recorded Cows.—The summer of 1934 was again fine, and, as in the previous year, there was

* The first part of this report appeared in the November, 1935, issue of this JOURNAL.

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prolonged drought, so that there was a consequent shortage of grass, and this had an adverse effect on milk yields in general. The average yield of full-year cows in 1933-34 was 704 gallons, and this, while showing an increase of 4 gallons over 1932-33, was still well below the record average yield of 719 gallons obtained in 1930-31.

The number and average yield of milk of all cows recorded, and of full-year cows, for each year since 1917-18, are given in Table XII.

TABLE XII.—AVERAGE YIELD OF RECORDED COWS.

Year Oct. 1 to Oct. 1	Particulars of all cows and heifers recorded			Particulars of cows recorded for full year			
	No. of cows and heifers	Total yield	Average yield*	No. of cows	Percentage of total cows and heifers	Total yield	Average yield*
		Gal.	Gal.			Gal.	Gal.
1917-18	19,793	8,426,958	426	8,775	44	5,255,923	599
1918-19	37,880	16,204,941	450	17,989	47	10,543,516	579
1919-20	61,323	29,344,887	479	27,266	44	17,393,347	637
1920-21	97,903	48,512,380	495	48,248	49	30,892,620	640
1921-22	117,023	60,463,617	517	63,318	54	41,208,073	651
1922-23	127,151	67,904,224	534	68,349	54	46,956,565	687
1923-24	138,086	73,963,165	535	73,338	53	50,299,884	685
1924-25	148,905	76,419,498	513	77,132	51	51,695,291	670
1925-26	154,322	81,623,788	529	81,669	53	56,102,434	687
1926-27	156,847	82,161,809	524	81,749	52	55,677,261	681
1927-28	149,971	76,896,131	513	77,171	51	51,931,633	673
1928-29	144,812	75,948,485	524	74,171	51	51,207,594	690
1929-30	140,266	75,293,001	537	71,432	51	50,766,164	711
1930-31	137,866	75,357,035	547	71,480	52	51,386,105	719
1931-32	135,912	73,793,049	543	70,826	52	50,243,265	709
1932-33	135,902	73,422,655	540	73,328	54	51,300,933	700
1933-34	141,325	76,274,826	540	74,493	53	52,423,417	704

* Before 1924-25 the average yield was calculated at the equivalent of 10½ lb. to a gallon, and subsequently at 10½ lb.

Increased average yields for full-year cows were secured by 29 societies, the largest increase being 564 lb.—from 6,281 lb. (608 gal.) to 6,845 lb. (662 gal.), in Cardigan-shire. The Derby and District Society had the highest average yield with 8,250 lb. (798 gal.), while Essex, Lancashire, Norfolk and Yorkshire also exceeded 8,000 lb. (774 gal.). Eight societies had average yields between 7,500 lb. (726 gal.) and 8,000 lb. (774 gal.), and 16 societies obtained average yields between 7,000 lb. (677 gal.) and 7,500 lb. (726 gal.).

The number of individual herds with average yields for full-year cows of 8,000 lb. (774 gal.) or over was 1,193, or

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28 per cent. of the herds recorded for the full year, as compared with 1,191 in the previous year. Herds with average yields of 10,000 lb. (968 gal.) or over numbered 254, against 241 in 1932-33, while 15 herds had average yields of over 13,000 lb. (1,258 gal.).

Table XIII contains some examples of the increases that can be effected in the average yield of herds as a result of the greater attention to breeding, selection and feeding, and the elimination of low-yielding cows that usually follow the adoption of milk recording.

TABLE XIII.

Herd	No. of years during which records have been taken	Average yield per cow in first year	Average yield per cow in last year	Increase in annual average yield per cow	No. of full-year cows in last year of period	Cash value of increase of last year over first year at 1s. per gallon			
						Per cow		Per herd	
A. (Pedigree Red Poll)	11	Gal 641	Gal. 858	Gal. 217	32	£ 10	s 17	£ 347	s 4
B. (Non-Pedigree Shorthorn)	6	601	964	363	17	18	3	308	11
C. (Pedigree Guernsey)	5	622	937	315	19	15	15	299	5
D. (Pedigree Friesian)	6	730	1,100	370	15	18	10	277	10
E. (Pedigree Jersey)	15	642	903	261	20	13	1	261	0

The number of cows that reached the standard yield of their breed or type in 1933-34 was 17,905, which compares with 16,764 in 1932-33 (Table XIV). The number of Shorthorns that gave the standard yield of their breed increased from 7,994 to 8,316, while Guernseys increased from 1,393 to 1,711 and Friesians from 4,552 to 4,818. Yields exceeding 20,000 lb. (1,935 gal.) were given by 74 cows, against 63 in 1932-33, while 10,852 gave over 10,000 lb. (968 gal.), an increase of 743 over the previous year. The highest yield during the year was 30,269 lb. (2,929 gal.) given by a Friesian cow owned by a member of the Essex Society.

The total number of cows and heifers of certain breeds recorded during the year ended October 1, 1934, and the number and average yield of the cows recorded for the full year, together with the percentage of full-year cows are

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TABLE XIV.

Number of Cows that gave the Standard Yield prescribed for their Breed or Type during the Year ended October 1, 1934, classified according to Breed and Yield.

Breed or Type	Standard yield	Yields (in lb.)								Total number of cows giving the standard yield
		8,000 to 9,000	9,000 to 10,000	10,000 to 11,000	11,000 to 12,000	12,000 to 14,000	14,000 to 16,000	16,000 to 20,000	Over 20,000	
		lb.								
Ayrshire	9,000		319	164	86	77	6	6	1	659
Blue Albion	9,000		41	18	9	11	2			81
Devon	8,000	56	19	3		2				63
Friesian	10,000			1,683	1,167	1,199	476	232	61	4,818
Guernsey	8,000	896	456	189	85	58	19	7	1	1,711
Jersey	8,000	374	183	113	56	34	6	1		767
Lincoln Red	9,000		120	71	35	30	6			262
Shorthorn										
Red Poll	9,000		365	215	116	94	24	3	1	818
Shorthorn	9,000		3,932	2,219	1,157	772	175	53	10	8,316
South Devon	8,000	107	59	31	16	11	4			228
Welsh Black	8,000	36	8	5	3	3	1			56
Other Breeds	8,000	74	25	17	6	2	2			126
TOTALS	—	1,526	5,527	4,728	2,736	2,293	719	302	74	17,905

* Includes 16 Dexter cows with yields of 7,000 to 8,000 lb. (Standard yield for Dexters is 7,000 lb.)

TABLE XV.

Breed or type	Total number of cows and heifers recorded	Particulars of cows recorded for full year			
		Number	Percentage of total of cows and heifers	Total yield	Average yield
				lb.	lb.
Ayrshire	5,438	2,663	48.9	19,248,749	7,228
Blue Albion	494	309	62.5	2,207,766	7,145
Devon	971	591	60.8	3,440,655	5,822
Friesian	23,179	13,221	57.0	117,754,657	8,907
Guernsey	11,982	5,797	48.3	38,320,333	6,610
Jersey	7,051	3,396	48.1	21,668,635	6,381
Kerry	364	190	52.1	1,168,398	6,149
Lincoln Red	2,113	1,084	51.3	7,735,614	7,136
Red Poll	6,190	3,795	61.3	27,441,021	7,231
Shorthorn	79,639	41,347	51.9	289,809,655	7,009
South Devon	1,044	983	50.5	6,229,695	6,337
Welsh Black	834	485	58.1	2,740,362	5,650

shown in Table XV. The number of Shorthorns recorded increased from 77,525 to 79,639, and Ayrshires from 4,114

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to 5,438, while there were increases of between 500 and 1,000 in the number of Friesians, Guernseys and Jerseys. Most of the breeds that were recorded in any considerable number showed an increase in the average yield. Shorthorns, which accounted for 56 per cent. of the total cows recorded, averaged 7,009 lb., against 6,989 lb. in 1932-33, while the average yield of Friesians increased by 79 lb., Guernseys by 157 lb., Jerseys by 74 lb., Red Polls by 55 lb. and Welsh Black by 78 lb. Devons, South Devons and Lincoln Reds, on the other hand, showed decreases amounting to about 100 lb.

Issue of Certificates.—The number of Certificates of Merit issued in respect of the three years ended October 1, 1934, was 562, as compared with 641 for the previous three-year period. In addition, 44 Certificates of Merit were issued during the year in respect of earlier periods. Certificates of Merit are only awarded on application by the owner, and on payment of a fee of 5s. per certificate, for cows that have given during a period of three consecutive Milk Recording Years the prescribed yield of milk for their breed or type and have been regular breeders. The number of members of societies who obtained Certificates of Merit was 182, a decrease of 19 compared with the previous year. Certificates issued in respect of the three-year period ended October 1, 1934, numbered 146 for Friesians, a decrease of 66, and 137 for Shorthorns, a decrease of 12, while Red Polls with 94, Guernseys with 85 and Jerseys with 63 showed small increases. The highest yields certified for the various breeds were:—Friesian, 66,933 lb.; Red Poll, 52,590 lb.; Shorthorn, 51,370 lb.; Ayrshire, 51,121 lb.; Jersey, 42,128 lb., and Guernsey, 39,604 lb.

Certificates of Milk Record in respect of one year only were in little demand and only 7 were issued, against 5 in 1932-33.

Register of Dairy Cattle.—Volume XVIII of the Register of Dairy Cattle was published early in June, 1935, and contains particulars of the 606 cows in respect of which Certificates of Merit have been issued since the publication of Volume XVII, and also particulars of 19 pedigree bulls that qualified for entry on the basis of the yields given by their dams and sires' dams.

Calf and Bull Marking.—The number of calves marked under the Ministry's Scheme for the earmarking and registra-

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tion of calves of milk-recorded cows was 14,771, an increase of 84 over the previous year. This is the fifth successive year in which an increase has been recorded, but the figure is still considerably below that of 1925-26 when 16,917 calves were marked. The number of heifer calves marked constituted 91 per cent. of the total, but 1,298 bull calves were marked as compared with 1,190 in the previous year, this being the highest number ever registered.

The number of bulls being used for service, and ear-marked and registered by societies for their members, was 41.

Testing for Butter-fat.—The Ministry's Regulations relating to Sampling and Testing for Butter-fat came into force in October 1, 1933. The scheme was adopted by 759 farmers, or about 18 per cent. of the total members of Milk Recording Societies, and testing was carried out in 831 herds containing over 24,000 cows. The arrangements made by the societies appear to have worked smoothly, but butter-fat testing appeals mainly to the pedigree breeder, as 80 per cent. of the herds tested consisted wholly or mainly of pedigree cattle.

Table XVI shows the total number of cows whose milk was tested on at least five visits of the Recorder during the year, classified according to breed and average percentage of butter-fat, together with the average percentage of butter-fat obtained by each breed.

TABLE XVI.

Number of Cows Tested for Butter-fat under the Ministry's Scheme during the Year ended October 1, 1934, classified according to Breed and Percentage of Butter-fat.

Breed or type	Percentage of Butter-fat								Total number of cows tested	Average Percentage of Butter-fat
	Under 3	3 to 3·5	3·5 to 4	4 to 4·5	4·5 to 5	5 to 5·5	5·5 to 6	Over 6		
Ayrshire ..	7	138	339	161	28	—	—	—	673	3·77
Friesian ..	382	1,386	652	64	12	—	—	—	2,496	3·31
Guernsey ..	1	14	197	703	861	453	139	28	2,396	4·64
Jersey ..	1	4	22	180	294	314	165	73	1,053	4·99
Lincoln Red	3	85	69	30	—	—	—	—	187	3·56
Red Poll ..	29	103	218	116	17	2	—	—	485	3·71
Shorthorn ..	82	831	1,168	345	48	9	2	1	2,486	3·61
Other Breeds	7	26	52	64	30	4	—	—	183	3·95
Totals ..	512	2,587	2,717	1,663	1,290	782	306	102	9,959	3·89

The total number of cows tested was 9,959, of which Friesians, Shorthorns and Guernseys accounted for approxi-

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TABLE XVII.—MILK RECORDING SOCIETIES.

Statement giving particulars of the 49 *Milk Recording Societies* operating during the *Year ended October 1, 1934.*

(The Societies are arranged in order of total numbers of Cows recorded)

Society	* No of members	* No. of herds	Total No. of cows recorded	No. of cows recorded for full year	Average yield of cows recorded for full year lb.
Essex County	199	235	9,574	5,262	8,167
Suffolk	286	327	9,186	5,197	7,870
East Sussex	239	271	8,453	4,276	6,791
Hampshire	185	219	7,465	3,927	6,960
Berkshire	164	193	7,011	3,831	6,895
Somerset and North Dorset	183	212	6,782	3,928	6,894
Norfolk	199	217	6,552	3,870	8,050
Hertfordshire County	174	190	5,877	3,200	7,333
Kent	128	149	4,617	2,389	6,979
West Sussex	123	137	4,510	2,354	7,376
Surrey	137	145	4,268	2,045	7,095
Lancashire County	112	120	4,207	1,553	8,020
North Wilts.	79	94	4,072	2,344	6,743
Gloucestershire	106	115	3,371	1,863	7,346
Oxfordshire	91	98	3,275	1,858	7,062
Yorkshire	101	106	2,987	1,191	8,118
Leicestershire and Rutland	87	92	2,886	1,456	6,578
Buckinghamshire	93	100	2,863	1,412	7,256
Warwickshire	98	101	2,747	1,421	7,152
Shropshire	67	69	2,639	1,237	6,956
Dorset	45	62	2,606	1,717	6,711
Cambridgeshire and District	78	87	2,446	1,302	7,553
Staffordshire	62	65	2,232	1,098	7,727
Northamptonshire	66	71	2,116	1,088	6,780
Bristol and North Somerset	70	75	2,052	1,184	6,766
South Wilts.	30	41	2,006	1,224	7,346
Nottinghamshire	49	51	2,006	958	7,349
South Devon and District	92	93	1,971	1,008	6,320
Cumberland and North Westmorland	82	84	1,953	866	6,353
Bedfordshire	53	55	1,744	858	7,444
Cheshire County	45	48	1,740	722	7,379
Derby and District	47	48	1,493	749	8,250
Worcestershire	59	60	1,459	748	7,063
Durham County	51	53	1,436	673	7,550
Peak (Derby)	51	52	1,283	592	7,865
Lincolnshire	34	36	1,257	609	7,479
Northumberland	41	45	1,169	655	7,684
East Devon	50	50	987	614	6,552
Campden, Moreton and Dist. (Glos.)	33	33	782	445	6,799
Kendal and South Westmorland	33	34	782	324	6,154
Monmouthshire and Brecon	36	36	770	370	7,468
Anglesey and Caernarvonshire	50	50	739	439	5,383
Denbighshire and Flintshire	30	30	658	335	6,936
Cornwall	39	39	648	366	6,522
Cardmarthenshire	18	18	478	282	7,383
Herefordshire	20	20	407	208	7,675
Cardiganshire	21	21	304	157	6,845
Glamorgan	15	15	252	148	7,951
Pembrokeshire	14	14	213	140	7,118
Totals	4,171	4,582	141,325	74,493	7,272

* Herds of Goats are not included.

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mately 75 per cent. The remainder consisted mainly of Jerseys, Ayrshires and Red Polls. An average of over 5 per cent. of butter-fat was yielded by 1,190 cows, practically all of which were Guernseys or Jerseys, while 2,953 averaged between 4 and 5 per cent. The average percentage of butter-fat for all animals tested was 3.89, while, as regards the breed averages, Jerseys were easily the highest with 4.99 per cent., followed by Guernseys with 4.64 per cent., the next highest being Ayrshires with 3.77 per cent.

Rationing.—Advice on rationing, as hitherto, has been given chiefly by the County Agricultural Organizers, and while reports received by the Ministry indicate that an increasing number of members of Milk Recording societies ration according to yield, there is a tendency in some parts of the country for the number of inquiries to decrease owing to the more general use of proprietary foods and to the fact that members are now more versed in food values.

Progeny Recording of Dairy Bulls.—The Milk Recording Scheme was extended as from October 1, 1934, to include a voluntary scheme for the progeny recording of dairy bulls, the object being to obtain information on the milk and butter-fat transmitting qualities of dairy bulls, by systematically recording the milking performances of their daughters.

Cost of Milk Recording.—The average cost of milk recording in 1933-34 showed little change as compared with the previous year; members paid an average of 4s. 3d. per cow and the Ministry's grants averaged 1s. 11d. per cow.

NOTE.—Detailed information concerning the Ministry's Live Stock Improvement Scheme is given in the following memoranda, copies of which may be obtained (single copies free of charge) on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1:—

Form No. A 763/T.L.	Scheme for the Improvement of Live Stock.
Form No. 609/T.L.	Bull Grant Regulations.
Form No. 466/T.L.	Boar Grant Regulations.
Form No. 89/T.L.	Heavy Horse Regulations.
Form No. 392/T.L.	Milk Recording Regulations (including the Butter-fat Testing Regulations and the Regulations relating to the Progeny Recording of Dairy Bulls, which are printed as separate pamphlets).
Form No. A 899/T.L.	Guide to the Licensing of Bulls in England and Wales.

(Concluded)

CHRONIC STREPTOCOCCIC MASTITIS : A METHOD OF CONTROL

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A RECENT experience by the writer in a number of dairy herd investigations showed clearly that the average dairy farmer does not fully appreciate the true nature of bovine mastitis, especially of the chronic variety. It should be clearly understood that a form of mastitis occurs in dairy cows in which obvious symptoms are frequently absent in the infected animal. This type of mastitis, caused by a small micro-organism known as a *streptococcus*, is frequently referred to by veterinary writers as chronic streptococcic mastitis. Mastitis of this type is usually a slowly progressive chronic disease in older stock, becoming most apparent towards the end of a lactation period. It is an insidious condition, particularly so because animals may be infected, be capable of spreading infection, and yet show no obvious signs of their abnormality. The absence of symptoms that farmers are ordinarily accustomed to associate with mastitis makes this variety one of extreme significance to the unsuspecting owner.

In the early stages, the only apparent abnormality that may be noticed is the appearance of clots, flakes or curds in the fore-milk from time to time, an occasional reduction in the yield from one quarter, and sometimes a display of symptoms in which there are obvious changes in the udder itself and in the nature of the milk secretion. Such changes are, more often than not, overlooked or totally ignored by the milker as of little consequence. In reality they are danger signals and must be regarded as such. Chronic streptococcic mastitis frequently extends over one, two or more lactations, and ultimately results in gradual and complete destruction of udder tissue, consequent diminution in milk yield, and progressive depreciation in the value of the animal.

It has been pointed out that cases of the disease may occur where no symptoms are present in spite of infection. The existence of these cases, to which the term "latent cases" has been applied, is of particular significance. In the

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absence of symptoms that are usually associated with udder abnormality, the cases are not suspected, and hence they provide an active source of infection to neighbouring stock for some time before they are recognized. Their detection and elimination is an essential step in controlling the disease.

The familiar terms garget, weed and felon, ordinarily applied to cases of mastitis by owners, refer usually to a condition in which mastitis infection is accompanied by drastic changes in the udder itself, with gross alterations in the character of the milk secretion. In this type of mastitis the beast obviously suffers pain and general discomfort, whereas there is usually no such disturbance with the chronic streptococcic form. Garget, as the term is commonly used, implies an attack of acute mastitis due to another type of micro-organism. Occasionally a streptococcic infection becomes acute in nature and may be mistaken for an attack of typical garget, but confusion need not arise if owners once recognize the existence of the commoner and less acute type of case in their herd. Acute mastitis or typical garget may end fatally, or in recovery with complete loss of the quarter; in that respect it is of some importance to the farmer. Nevertheless, as a factor of economic importance generally, it falls far behind the streptococcic form, since stringent precautions to avoid spreading infection are usually taken from the outset, whereas in the chronic insidious form they are not. Freedom from so-called typical garget cannot be taken as a criterion that mastitis infection is not present in a herd.

In a recent survey of mastitis in this JOURNAL, Stableforth* emphasized the economic importance of chronic streptococcic mastitis. To the latent cases of infection, such as have been described, he attributed the term "hidden infection." In the course of Stableforth's observations, attention was effectively drawn to the widespread wastage resulting from diminished milk yields, and the maintenance of stock whose productive capacity had been seriously impaired by mastitis infection of this nature. To the producer, this aspect of the problem is of paramount importance if the best is to be got out of available stock. Lowered milk-producing capacity appears to be the inevitable sequel of streptococcic mastitis infection. The intermittent decrease in yield, so often referred to by farmers as "going light on

* Stableforth, A. W.: This JOURNAL, Vol. XLI, No. 10, January, 1935, pp. 945-955.

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a quarter," eventually results in a more or less complete cessation of function in the infected quarter. Since the condition frequently extends over several lactation periods the gradual weakening in milk-producing capacity is responsible for considerable wastage. It can be easily seen, moreover, that the condition tends to become manifest in animals that are arriving at an age when their powers of production are at their highest. The maintenance of stock that show such deterioration over a number of years is definitely not an economic proposition. Even a high standard of feeding can do little to counteract this drain. One wonders to what extent this disease is responsible for the inability of many progressive farmers to get satisfactory results in spite of their excellent methods of management.

Since udder health is the basis of sound herd-management and economic milk production- greater importance should be attached to slight irregularities in udder function.

Spread of the Disease : Elementary Precautions.—

There is considerable evidence to show that streptococcic mastitis is spread in the course of routine milking, whether by hand or by machine. The indiscriminate milking of cows of all ages, irrespective of udder abnormality, is undoubtedly responsible for the incidence of this disease in certain herds. An animal becomes infected, shows little signs of infection beyond the appearance of a few clots at milking time, milking is proceeded with and the milker passes on to the next beast and so the infection is spread. By simple observation, and an understanding of how the disease manifests itself in the early stages, the farmer can do much to maintain his stock free from gross infection. The appearance of clots in the milk from time to time, occasional lightening in yield from a quarter, and gradual induration or hardening of tissue in a quarter, should be regarded with grave suspicion. Animals that show such signs should be placed at one end of a shippoon *and be milked last*. Heifers are usually free from infection, and should form a separate group and be milked first. The milking of cows according to age, commencing with the younger stock, might be usefully considered.

A means for aiding the detection of clots in the course of routine-milking will be described later

Detection of Infected Stock : Principles of Control.

—Whilst it is possible for owners to detect and eliminate a

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proportion of obvious cases by exercising simple powers of observation, a large number of infected animals must be picked out by special diagnostic methods. The detection and segregation of the infected animal from the herd is the basis of control and eventual eradication.

Chronic streptococcic mastitis of dairy stock is definitely a contagious disease, and its control demands exactly the same principles that are applied to the control of contagious abortion, tuberculosis and Johne's disease. The diseased must be separated from the healthy, and that division must be maintained if further infection is to be avoided.

This can only be successfully carried out by the separation of the infected individuals and their maintenance under conditions that prevent them from being an active source of infection. It has been found by experience that the necessary segregation can reasonably be adopted on the ordinary, average dairy farm without undue disturbance of general herd management. This opinion has been expressed by several northern dairy farmers who have experience of the scheme.

Methods of Control : Essential Features.—In the control of any contagious disease of live stock it is necessary that certain factors shall be considered. The method must be practical, economical and easily applied. Intelligent and enthusiastic co-operation on the part of the owner can offset, in many ways, lack of accommodation or facilities.

It should be understood that for picking out infected cases an accurate or reasonably reliable method must be applied, preferably by a veterinarian who will make himself responsible for the administration of the scheme.

It has been suggested that the only reliable method of diagnosis is the bacteriological examination of specially-drawn milk samples. Whilst the accuracy of diagnosis of this method is undeniable, it possesses certain disadvantages that make it unattractive to veterinarians in the field. The collection and despatch of milk samples to a laboratory involves much labour and care; the laboratory examination is a complicated technique and requires several days to complete; it is an expensive procedure and necessitates at least two visits on the part of the veterinarian controlling the work. It is even possible that the interval between collection of samples and the receipt of a report may permit a number of fresh cases of infection to arise and thus confuse the final issue.

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From the farmer's point of view considerable advantage is to be gained by a method that would remove these objections, through direct application on the farm and completion in one day. It is with this object that this article has been prepared—to record a method that has been applied to a number of badly-infected herds and for use on the farm itself.

Diagnosis is based upon three main factors that are entailed in this method:—

- (1) The history of the animal as supplied by the owner;
- (2) The clinical examination of the udder; and
- (3) A supplementary chemical test applied to the milk for the detection of certain changes associated with mastitis infection.

The Chemical Examination of Milk as an Aid to Diagnosis : the Brom-Thymol Blue Test.—In recent years German and American workers have taken great interest in the chemical analysis of milk as an indication of mastitis. In America particularly, this interest has reached the stage where chemical tests are daily employed as a routine procedure in the control of streptococcic mastitis.

It is now widely recognized that milk from diseased udders undergoes considerable variation in chemical composition, milk substances elaborated from the glandular structure being decreased and the products of inflammatory reaction increased. Chemical tests based upon the altered relationships of the chemical constituents have been evolved and considerable work has been carried out on their diagnostic and comparative value.

The large number of tests recently described in this connexion are of varying reliability, and of limited value for field application. The main disadvantage of chemical analyses lies in the fact that they cannot be applied to mixed milk samples or even to mixed quarter samples. It is generally admitted that the accuracy of chemical tests is enhanced by the making of several at once and on single-quarter samples of freshly-drawn milk. Their chief attractiveness lies in the fact that they can be undertaken by a veterinarian working in a shippin—unlike the bacteriological method, which requires laboratory facilities. Their main value undoubtedly lies in their use as a supplementary diagnostic method in the field control of the disease.

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The brom-thymol blue test as an indication of increased alkalinity and mastitis infection has received great publicity in recent years. As a means of diagnosis it has been subjected to much criticism, no doubt because exaggerated claims were prematurely made on its behalf. The literature suggests, however, that it possesses considerable value, and in the writer's experience has proved itself to be a useful supplement to clinical diagnosis. The brom-thymol blue test can be rapidly and conveniently carried out in the shippon, and can thus be applied by the veterinarian without recourse to laboratory facilities.

Procedure.—The method has been applied to at least five badly infected herds, and has been instrumental in considerably reducing infection and preventing the appearance of fresh cases for considerable periods. No difficulty has been experienced in persuading owners to revise their methods of milking. Their interest in the scheme has been stimulated by the fact that they themselves participate in the testing process, and can see for themselves the test applied to their stock. No undue disturbance in herd management has been experienced, monthly tests being carried out at milking time, so obviating unnecessary interference with farm routine.

The fore-milk of each cow is examined for the presence of clots. To aid detection, and as a *permanent pre-milking procedure*, the use of a cloth-sieve or Alfa-laval black-lacquered strip cup is advocated. The owners are requested to note the appearance of flaky-milk in their stock, and record other abnormalities between tests. The age of the cow, milk yield, and stage of lactation are carefully noted in each case.

A sample of milk drawn from each quarter into a chemically-clean test tube (1 test tube per quarter) is then subjected to chemical examination by means of the brom-thymol blue test; 5 c.c. of milk, obtained by means of a suction pipette, are replaced in the tube after discarding the surplus. 0.5 c.c. of brom-thymol blue solution (0.5 gm. brom-thymol blue powder in 125 c.c. of 47.5 per cent. methyl alcohol adjusted to neutrality with a few drops of NaOH) is then added to the sample of milk.

The tubes placed in marked racks are inspected in a good light for evidence of colour change, which is the characteristic reaction. Fresh normal milk gives a greenish-yellow coloration. Green, dark green, very dark green and

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deeper shades extending to blue show quite definite alkalinity and denote mastitis infection. The degree of colour change is no indication of the extent of the disease process.

Care must be taken not to confuse variations met with at the beginning and end of lactation in normal cows. A definite light green colour *in all four quarters* is frequently seen towards the end of lactation when only a small quantity of milk is being given. During the early stages of lactation the influence of colostrum upon the milk tends to produce a light creamy yellow reaction in all four quarters, indicating an acid reaction.

Abnormal milk reactions generally show a green discoloration of varying shades from green to very dark green in one or two tubes.

A careful record should be made of the corresponding quarter and degree of colour change.

Clinical Examination.—The veterinarian who carries out this examination should do so only after milking has been completed in the herd. A note should be made of any udder abnormality, bearing in mind the chemical reaction in each quarter. As a rule those quarters that show a very definite reaction to the brom-thymol blue test show some degree of induration on clinical examination.

In a series of approximately 500 tests involving the examination of 2,000 quarter-samples the brom-thymol blue test has proved to be of definite value as an aid to diagnosis. The combined test, clinical examination and history of each animal will detect a very large proportion of infected cases. In a series of cases, bacteriological examination of milk samples has confirmed this method of examination.

Herd Grouping.—The purpose of the examination accomplished, namely, the detection of infected animals, the next step in procedure is undertaken. The herd is divided into three main groups in the following manner:—

Group I.—Animals that show no clinical evidence of udder abnormality, that give no reaction to the brom-thymol blue test, and bear no history of previous milk abnormality

Group II.—Animals that show alternatively (1) evidence of udder abnormality clinically, with slight or no reaction to the chemical test, or (2) a definite colour reaction (dark green) with no evidence clinically.

Group III.—Animals that are definite reactors to the test, that show definite abnormality clinically, and animals that may be described as obvious cases.

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The herd is then grouped in the shippon according to this formula. The standings should first be thoroughly disinfected before placing the animals in this order. This separation must be rigidly adhered to, and routine milking carried out strictly according to the order in which the animals are placed. This separation is retained until another test is carried out at an interval of one month. No difficulty has been experienced in this grouping system. The periodic reshuffling of places may lead one to suppose that confusion might prevail, particularly during the summer when animals return for milking. It has been found that supervision is only necessary for a day or two and that cows quickly adapt themselves to their new standing.

General Recommendations.—The main object in grouping is, of course, that routine-milking will commence with Group I and proceed automatically to Group II and on to Group III.

The use of a strip cup for the detection of clots in the fore-milk before milking should be accepted as a permanent routine procedure.

Heifers entering the herd may be presumed to be free from infection and be placed immediately in Group I. Newly-purchased stock should be isolated and tested before entering the herd. Farmers may test such animals by means of the many specially prepared “papers or discs” now sold for this purpose. Such a test should only be regarded as a rough and temporary measure. In purchasing stock, preference should be given to young animals: the purchase of old, high-yielding cows in the open market is fraught with considerable danger.

If an animal in Group I at any time shows clots in the milk or other abnormality it should be placed in Group II pending a further herd test.

The oldest cows in Group III should be gradually discarded.

As far as possible separate utensils should be reserved for Groups I and II, and this point applies most particularly to udder cloths and buckets. Milkers should wash their hands in an antiseptic solution after milking each animal.

Summary.—Chronic streptococcic mastitis in dairy cows is an extremely prevalent, insidious and contagious disease. Animals may be infected and spread infection, and yet show no signs of the disease.

TUBERCULOSIS (ATTESTED HERDS) SCHEMES

Infection is spread by the hands of the milker or by the milking machine. Clots in the fore-milk, occasional lightening in yield on one quarter, gradual decrease in yield, and induration of udder tissue in a number of cows, should be regarded with grave suspicion.

Control is based on the elimination of infected stock, their segregation, and a general revision in routine-milking procedure.

Methods of control and eradication of bovine mastitis follow the general principles of controlling other contagious diseases of live stock, and should be left in the hands of a veterinary practitioner.

The brom-thymol blue test appears to possess considerable value as a supplementary diagnostic agent.

TUBERCULOSIS (ATTESTED HERDS) SCHEMES :

REGISTER OF ATTESTED HERDS

THIS Register comprises a list of herds in respect of which Certificates of Attestation have been issued up to October 10, 1935, under the terms of:—

- (a) the Tuberculosis (Attested Herds) Scheme (England and Wales) of the Ministry of Agriculture and Fisheries, London; and
- (b) the Tuberculosis (Attested Herds) Scheme (Scotland) of the Department of Agriculture for Scotland, Edinburgh.

The issue of a Certificate of Attestation is evidence that the owner of the herd has taken steps to eradicate tuberculosis from the herd and that, as a result of a tuberculin test made by a Veterinary Inspector of the Department concerned, the herd has been found to be free from tuberculosis. The rules that must be observed by the owner of an attested herd are designed to prevent the herd from becoming infected with disease by the introduction to the herd of animals that may be infected with tuberculosis or by contact with such animals.

Full details of the schemes may be obtained on application to the Department concerned.

TUBERCULOSIS (ATTESTED HERDS) SCHEMES

TUBERCULOSIS (ATTESTED HERDS) SCHEMES FOR ENGLAND AND WALES AND SCOTLAND:
REGISTER OF HERDS ATTESTED UNDER THE ABOVE SCHEMES UP TO NOVEMBER 26, 1935.

County	Name of Owner of Herd	Address of Premises on which Herd is kept	Date from which Certificate of Attestation was valid, 1935	Breed or Breeds of Cattle comprising the Herd	No. of Animals in Herd at Date of Attestation
1. ENGLAND.					
BERKS.	His Majesty The King Vice-Admiral F. Clifton Brown, C.B., C.M.G.	The Royal Farms, Windsor Bowling Green Farm, Faringdon	March 15 May 25	Various Friesian	64 63
BUCKS.	Mr. C. E. S. Gillett Lt.-Colonel E. Brown Mr. P. J. Pursell	Randalls Farm, Wokingham The Pastures Farm, Penn Brook Farm, Stoke Mandeville, Aylesbury	June 15 October 23 October 11	Various Guernsey Shorthorn	48 53 16
CHESTER	Done's Certified and Grade A (T.T.) Dairies	Manor House Farm, Malpas	June 1	Mainly Shorthorn	118
DEVON	Colonel A. D. Acland	Fenton Court Farm, Honiton	February 4	Devon	44
ESSEX	Miss E. A. Stange	Mulberry Farm, Earls Colne	May 30	Jersey	38
GLOUCESTER	Mr. J. Bourne	Snowhill Hill, Moreton-in-Marsh	April 16	Ayrshire	20
HAMPSHIRE	Mr. H. R. Prier	Darby Green, Blackwater	May 7	Jersey	20
HERTFORD	Mr. E. Aron	Hillside, Hunton Bridge, King's Langley	February 1	Jersey	34
KENT	Mr. W. Alexander Do. Do. Messrs. K. A. Latter and J. Thompson Do. Do.	Home Farm, Eynsford Parsonage Farm, Eynsford Castle Farm, Shorcham Dale Farm Weald, Sevenoaks St. Augustine's Farm, Weald, Sevenoaks Wickhurst Manor Farm, Weald, Sevenoaks	February 1 February 1 February 1 February 1 February 1 February 1	Various Various Various Jersey Jersey	55 20 88 66 30
NORFOLK	Sir John B. Lloyd	Foxbury, Stone Street, Sevenoaks	February 1	Mainly Jersey	27
OXFORD	Mrs. E. M. Watson-Kennedy	Wiveton Hall Farm, Cley	February 28	Jersey	34
SOMERSET	Mrs. L. K. Haldane Mr. G. F. D. Shapland Mr. J. F. D. Shapland	Cherwell Green Farm, Claverham Park Field, Brockley, near Bristol	November 8 March 27 November 7	Jersey Jersey Guernsey Guernsey	74 15 52 17
SURREY	Sir John Leigh, Bart., M.P.	The Dairy, Brook, Godalming	February 1	Guernsey	24
SUSSEX (East)	The Misses Andrews and Spencer The Earl De La Warr	Manor Farm, Chalvington Buckhurst Farm, Withyham	February 3 October 3	Guernsey Various	46 39

England (continued)

SUSSEX (West)	Mr. J. V. J. Stephens	..	Old Barn, Hellingly	..	August 14	Jersey	15
	Mr. J. Sturgis	..	Hamsey House Farm, near Lewes	..	October 6	Guernsey	16
	Mr. H. H. Swann	..	Little Boarzell, Hurst Green.	..	March 3	Jersey	46
YORKS (NORTH RIDING)	Mr. F. J. Cox	..	Etchingham	..	February 1	Mainly	38
	The Hon. Mrs. E. Emmet	..	Biddeside Farm, Slindon Com- mon, Arundel	..	February 25	Guernsey	29
	Mr. G. P. Cawthorn	..	Castle Farm, Amberley	..	July 14	Mainly Dexter Shorthorn	14
CARDIGAN	Mr. G. O. Evans	..	2. WALES Pantygornw, Glynarthren, Llan- dysul	..	October 11	Mainly Shorthorn	15
	Mr. T. Morgan	..	Maeslan, St. Clears	..	September 18	Shorthorn	48
	Mr. D. Thomas	..	Clarebrook, St. Clears	..	April 24	Mainly	13
DENBIGH	Mr. I. H. Ungoe-Thomas	..	Parsons Leys, Laugharne	..	May 19	Shorthorn	31
	Mr. T. E. Walters	..	Penrheol, St. Clears	..	February 1	Mainly Shorthorn	9
	Mr. T. Wilkins	..	Closteg, Llangendeirne, Kidwelly	..	October 19	Friesian Mainly	31
MERIONETH PEMBROKE	Messrs. Valley Farms (Aber- wheeler), Ltd.	..	Ty-Draw Farm, Bodfari	..	June 11	Shorthorn	66
	Mr. G. E. Jones	..	Tanyfron Farm, Dolgelley	..	June 5	Various	17
	Mrs. M. Lewis	..	Penquarre Farm, Crymmych	..	November 1	Various	26
AYR	Mr. J. W. Thomas	..	Castle Farm, Maenclochog, Cly- derwen	..	April 21	Mainly Shorthorn	23
	Mr. John Baird	..	3. SCOTLAND Wynds Farm, Galston	..	May 1	Ayrshire	65
	Mr. William Bruce	..	Kingenceugh Farm, Mauchline	..	July 22	"	84
AYR	Mr. Alexander Cunningham	..	Gateside Farm, Stewarton	..	April 3	"	105
	Mr. James Currie	..	Underlaw Farm, Darvel	..	May 22	"	70
	Mr. Robert Cuthbertson	..	Toponthead, Kilmarnock	..	October 8	"	83
AYR	Mr. Thomas Drummond	..	Craighead, Mauchline	..	February 23	Various Ayrshire	61
	Mr. Cuthbert Gemmill	..	West Hillhead, Mauchline	..	February 14	"	65
	Messrs. John and William Smith Gordon	..	West Ashyard, Hurlford	..	June 16	"	91
AYR	Mr. John Hodge	..	Loudoun Mains, Newmilns	..	February 22	"	94
	Mr. Matthew Howie	..	East Newton, Newmilns..	..	November 15	"	99
	Mr. Robert Kennedy	..	North Logan, Catrine	..	September 28	"	30

TUBERCULOSIS (ATTESTED HERDS) SCHEMES

County	Name of Owner of Herd	Address of Premises on which Herd is kept	Date from which Certificate of Attestation was valid, 1935	Breed or Breeds of Cattle comprising the Herd	No. of Animals in Herd at Date of Attestation
Scotland (continued)	Mr. James Mair	Auldybres, Drougan	February 15	Ayrshire	65
	Mr. William Mitchell	Grougar Mains, Kilmarnock	April 17	"	77
	Mr. Hugh F. Reid	Greenside, Kilmarnock	September 24	"	76
	Mr. John Muir Richmond	Dykefield, Mauchline	February 23	"	66
	Messrs. Andrew and John M. Smith	Kneavacklaw, Darvel	October 10	"	94
	Mr. David Smith	Kilmaurs Mains, Kilmarnock	October 15	"	118
	Mr. John Smith	Nether Newton, Newmilns	September 16	"	66
	Trustees of the late David Stevenson	Changeue, Cumnock	November 20	"	84
	Mr. Hugh Taylor	Bellisle Farm, Hurlford	June 4	"	69
	Mr. John Templeton	Willoxton, Mauchline	November 23	"	83
DUMFRIES	Mr. Thomas Templeton	Hullhead, Sorn, Mauchline	July 22	"	92
	Mr. William Templeton	Syke, Mauchline	November 6	"	59
	Mr. John Weir	Over Glaisnock, Cumnock	August 1	"	87
	Mr. Hugh Woodburn	Killoch, Galston	August 25	"	103
	Mr. Allan Caldwell	Auchenhessane, Perpont	August 13	"	70
	Mr. David Wilson	Barclay, Kirkcudbright	February 25	"	77
	Mr. Thomas M. Rae	Lennox Plunton, Kirkcudbright	July 24	"	92
	Mr. John Barber Spreat	Woods Farm, Auchenhessane	November 2	"	167
	Mr. Thomas A. Ballantyne	Scorrieholm, Lesmahagow	February 5	"	73
	Mr. John Kirkwood	Dumbraxhill, Lesmahagow	June 17	"	70
LANARK	Mr. William Steel	"	May 28	"	83
	Mr. Thomas C. Stewart	Southfield, Kirkmuirhill	April 2	Mainly Ayrshire	118
MIDLOTHIAN	Dr. E. P. Calder, J.P., and Mr. J. S. Holgate	Stagehall Farm, and Torsence Mains, Stow	June 4	Ayrshire	254
	Royal Victoria Hospital Trust	Gracemount Farm, Liberton, and Romanno Mains, Peebles-shire	February 5	Ayrshire	93
PEEBLES	Mr. Thomas A. Thomson	Muirhouse, West Calder	February 6	"	57
	Mr. Alexander Clarkson	Skirling Mill, by Biggar	March 17	"	62
RENFREW	Mr. Joseph Andrew Wylie	Barnbeth, Bridge of Weir	April 24	British Friesian	24

IMPERIAL FRUIT SHOW, 1935

It was a fine tribute to English fruit-growers that the standard of the exhibits in the competition classes at the recent Cardiff Show reached so high a level and were so many in number. Yet the year 1935 will long be remembered by fruit-growers as a season of disasters; the early promise of a wealth of blossoms was dashed by the memorable frosts of May 15-17 and the storms of September bade fair to wreck such fruit as was left.

Reference to the judge's score card and schedule substantiated the general impression. In Class I of the British Empire section for 10 to 20 boxes of dessert apples (any variety) there were 10 entries, and in Class II for 10 or 20 boxes of culinary apples, 13 entries.

In the early days of the Show the Canadian apples often won the premier award, but improvements in the English exhibits were soon made and for a time these won, and have done so for the last six years. This year, however, the Canadian exhibit, 10 boxes of Delicious submitted by James Lowe, just won by the narrow margin of $\frac{1}{4}$ point over the best English exhibit, which consisted of Cox's Orange Pippin shown by Miss Amos. All the awards in the culinary apple class were won by English growers, the first prize being gained by W. F. Gaskain. In the United Kingdom Championship class for 20 half-boxes of any dessert variety there were 8 entries, the prize being won by F. P. and C. P. Norbury with an exhibit of Cox's Orange Pippin, other varieties shown in this class being Allington Pippin, King of the Pippin and Worcester Pearmain. Allington Pippin was numerically poorly represented in the separate class for this variety: this variety seems to be losing favour with both growers and consumers.

In the other classes for dessert apples, it is noteworthy that the standard of quality was so high, in general over 90 per cent. was necessary in order to gain a 1st prize—no mean achievement for growers with depleted crops from which to choose their exhibition apples.

Culinary apples, for which England is justly famed, and is in fact self-supporting, were even better represented. In Class 10 (U.K. Championship) for 4 boxes of Bramley Seedling there were 16 entries, the 1st prize being won by

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W. F. Gaskain, who scored 96½ points. This variety predominated in Class 9 (U.K. Championship) for 20 boxes of any culinary variety (also won by W. F. Gaskain) and maintained the position it has won as the premier English culinary variety, although there was a fair showing of the less popular but more frost-resistant Newton Wonder, of which there were 6 and 5 entries in the two classes for this variety. An exhibit of the Canadian culinary variety, Rome Beauty, offered scope for comparison.

The difference in the appearance of the skin quality between different samples of Bramley's Seedling was very noticeable, but it is now becoming accepted that it is the light green type that is required. Bramley's Seedling that is yellowish-green or heavily striped with red is less in demand; the most colouring that is tolerated is a dull reddish flush partly overlying a true green base.

Culinary apples in other packages were also represented, particularly the 4-bushel baskets of Bramley's Seedling, and other culinary varieties. A rather larger apple is recognized here as being the best commercial size. In the Canadian classes a new container—the "hamper," a light package made of chip wood with wire handles, made its appearance; this resembles the old Gloucester bonnet and is light and cheap, though not very strong.

The number of entries of apples packed in single layer trays gave evidence of seasonal disadvantages, but were of creditable quality. The best size of apple for this type of package is again slightly larger than the optimum for boxes. Paper cups, green or chocolate brown in colour, have become recognized as the best wrap, but there is still diversity in the method of laying the fruit, most of the apples being placed "cheek-up," but some "eye-up." In the Canadian barrels, the top layer is placed eye-up.

Packing was also an important feature in the competition classes for pears, where a very high degree of excellence was seen in the prize-winning exhibits, especially in the U.K. Championship classes, in all of which the first prizes were won by T. Neame. The best and most costly pears (Doyenné du Comice) require very careful packing, each pear being separated from its neighbour to prevent bruising. This is best achieved by bedding each fruit in a soft pad of wadding, and in the prize-winning exhibits practically full points were awarded for this. Of the less delicate and

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cheaper pears (variety *Conférence*) more fruits must be packed in each container, but can be packed to reach the consumer in perfect condition if wedged into position either horizontally with a partition down the centre of the tray, or obliquely with all the stalk ends facing the same way. Pears packed in boxes also comprised an exhibit of high standard; the variation in shape and colour of fruits of the variety *Conférence* in Class 21 was noticeable, but it appeared that the elongated pear with an olive or yellow-green skin, slightly mottled, was preferred.

A large quantity of fruit, 52 entries in all, was exhibited in the Canadian championship classes, while the Overseas section, more adequately represented at the spring and summer sections of the Fruit Show previously held in London, comprised exhibits of Late Valencia, Navel and other oranges, lemons and grape fruit from South Africa.

There was also a big entry of cider apples, the silver Challenge Shield awarded by the National Association of Cider Makers being won by G. T. Tatchell. The high quality of the cider fruit was noticeable, and the presence of good samples of bitter-sweet varieties (e.g., Dabinett and Knotted Kernel), and such vintage varieties as Kingston Black and Foxwhelp, show that these valuable varieties have now come to the fore.

The 31 classes for canned fruit and vegetables elicited nearly 200 entries, and the standard of excellence set in previous shows was well maintained. The chief winners were the Lincolnshire Cannery ("Lin-can"), who won the silver challenge cup, the Co-operative Wholesale Society, and Messrs. Baird, Wolton and May. The inclusion of a display tin, through the transparent end of which the contents of the can are visible, rendered the exhibit of greater interest to the general public. Entries of honey and cider were numerous and of high quality; the second year in which jams and preserves were included did not, however, bring a large increase in the support of these classes. It is to be hoped that in future years a prize in these classes will be regarded as an increasingly enviable blue ribbon.

The Imperial Fruit Show, with its prestige and average daily attendance of over 8,000 visitors, represents an unequalled opportunity to make the general public "fruit conscious" and wonderful displays of fruit were staged in the hall. Pre-eminent among these were the stands belonging to the Dominions and Colonies, all of which were

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exceptionally successful in presenting their produce to the public in an attractive and interesting way. Canadian apples almost dazzled the eye with their colour and polish, while Malaya was surrounded by crowds watching the demonstrations of the methods of cooling pineapples. South Africa's orange-juice drinks were much patronized, and Australia and India did a brisk trade in samples of their produce, particularly the latter with guava jelly, canned mangoes and cashew nuts, many visitors taking the opportunity of tasting these for the first time. Even the abundant trade exhibits of all kinds seemed to contain a predominance of fruit from overseas. An exception was the splendid display of fruit (mostly English) put up by Messrs. William Morgan, who won the Challenge Cup for the best trade stand in the Show.

This most excellent publicity is sure to widen the markets for fruits from our Overseas Empire, and many people have wondered whether the English apples are not in danger of being squeezed out at a time when extensive fresh plantings have been made, as no organization was demonstrating the use of these.

Several exhibits were staged by educational and official bodies, who thus brought before the grower and visitor the facilities offered in this country for the assistance of the fruit grower. The large stand under the auspices of the Demonstration of Marketing Branch of the Markets Division of the Ministry of Agriculture included a demonstration of grading and packing apples, a display of National Mark produce, and of publications and leaflets. The Research Stations demonstrated aspects of research, and the County Education Authority of Glamorgan staged interesting exhibits.

Finally, exhibits by the National Allotments Scheme reminded the visitor that the Show was being held in Cardiff, in the midst of one of the "Special Areas."

The Show fully realized its object of making the population of Cardiff fruit conscious. That this was achieved is clear from the support given to the Show by the people of the district, headed by the civic officials of Cardiff. The Mayor's presence at the opening ceremony, his Civic Reception given in honour of the Show, and the support of the Press, were invaluable contributions to its success. The attendance, despite bad weather, exceeded 68,000.

REPORT ON THE WORK OF THE EDUCATION AND RESEARCH DIVISION OF THE MINISTRY, 1933-34*

III—HORTICULTURE

HORTICULTURE is an industry of great and growing importance in this country. It is difficult, however, to determine its precise value, first, because the statistics that the Ministry collects relate only to holdings exceeding 1 acre, and, secondly, because details of the less important crops do not appear in the annual returns. On the first point, it may be observed that below the limit of 1 acre there is a large number of holdings devoted to horticulture, and there is also a multitude of allotments and private gardens, from which considerable supplies of vegetables, flowers and fruit are obtained for the use of the occupiers' families. In 1934 it was estimated, for example, that there were in England and Wales approximately 936,000 allotments covering an area of 134,000 acres. On the second point, it is satisfactory to know that for 1935 arrangements were made to collect statistics of acreage for the principal orchard and soft fruits, flowers, hardy nursery stock, tomatoes and other crops under glass, as well as for an extended number of varieties of vegetables.

The *value* of horticultural production has previously been estimated by the Ministry once in five years; the last estimate was made in 1930-31, since when there is known to have been a considerable expansion of horticultural output in many directions. According to this last estimate the value of that output on holdings exceeding one acre amounted to over £27 million as compared with approximately £33½ million for all farm crops if all potatoes are included under farm crops; if potatoes are included under horticultural crops, the approximate figures become £39 million for the horticultural output as compared with £21½ million for the output of farm crops.

In the three years, 1931-1934, the area under fruit has grown by 9,000 acres, and that under vegetables by 33,000 acres (much of it land previously devoted to farm crops);

* Concluded. Part I of this Report, dealing with Agricultural Research (including Local Investigation and Advisory Work), appeared in the issue for October, and Part II, dealing with Agricultural Education, in the issue for November, 1935

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and it is known that there has recently been a considerable increase also in the production of flowers (including bulbs) and of crops under glass. Since 1931, also, there has been particularly marked development in the culture of early salads and other vegetables under frames, and in an almost entirely new industry—that of mushroom growing. These increases have been obtained under the shelter of the Government's tariff policy; there are now import duties on all kinds of horticultural produce.

The work of the Ministry for the benefit of the horticultural industry may be classified under several heads:—

- (a) It assists research work at horticultural research stations.
- (b) It assists local advisory and investigational work at provincial centres, this work being to a large extent devoted to devising methods of combating pests and diseases of horticultural crops and advising growers accordingly.
- (c) It assists County Councils to maintain on their staffs horticultural superintendents and instructors whose business it is to conduct demonstrations and experiments in horticulture and to give growers advice.
- (d) It exercises powers for the protection of crops (both agricultural and horticultural) from infection by plant diseases and pests.
- (e) It assists the export trade in nursery stock, potatoes, etc., by the examination of plant material for the issue of health certificates prescribed by importing countries.
- (f) It assists growers to obtain reliable material for planting.
- (g) It issues information as to the condition of fruit and vegetable crops, and early estimates of yields of these crops.
- (h) It gives a certain amount of horticultural advice direct from the headquarters of the Ministry and through its inspectors, and also by means of bulletins and leaflets.

The work under heads (a), (b) and (c) above has already been described in detail in earlier sections of this report. The following sections deal with the work under the other heads.

Protection of Crops from Infection by Plant Diseases and Pests.—The action taken by the Ministry to safeguard the crops of the country from attacks by plant diseases and pests proceeds mainly by use of the powers conferred by the Destructive Insects and Pests Acts 1877 to 1927, and exercised through Orders made under those Acts. It can conveniently be considered under the following heads:—

- (1) Prevention of the importation into this country of unhealthy material for planting and of crops likely to introduce specific pests such as the Colorado Beetle, the Cherry Fruit Fly and the Apple Fruit Fly.
- (2) Prevention of the sale within the country of unhealthy material for planting.
- (3) Prevention of the spread of (and reduction of existing infection by) certain established diseases such as Wart Disease of Potatoes, Silver Leaf and Onion Smut.

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(4) Eradication of pests that have *not* definitely established themselves in the country.

(5) The empowering of local authorities to take action to prevent the spread of infection from orchards in which a satisfactory standard of plant hygiene has not been maintained.

PREVENTION OF IMPORTATION OF UNHEALTHY MATERIAL FOR PLANTING

The following Orders under the Destructive Insects and Pests Acts empower the Ministry to prevent the importation of unhealthy plant material:—

The Importation of Plants Order of 1933 and Amending Order of 1934.

The Importation of Elm Trees and Conifers (Prohibition) Order of 1933.

The Importation of Raw Cherries Order.

Importation of Plants Orders of 1933 and 1934.—

The last report contained full details of the Importation of Plants Order of 1933, which had come into operation on July 15, 1933 (see this JOURNAL, Vol. XLI, No. 9, Dec., 1934, pp. 863-891).

The main provisions of the Order may be summarized briefly as follows:—

The importation of potatoes grown in the United States of America, Canada and France is prohibited.

Official certificates of health must accompany all living plants and potatoes imported from overseas countries: an additional statement is required in respect of plants from France.

A similar statement must accompany consignments of raw vegetables and cider apples imported from France between March 15 (now April 8—see below) and October 14 in each year: raw vegetables and cider apples from other countries landed during the same period must be accompanied by certificates of origin.

Apples grown in the United States of America and landed between July 7 and November 15 in each year must be certified to be of one or other of the two highest grades recognized by the Federal Department of Agriculture.

Imported plants, potatoes, raw vegetables or apples landed in contravention of the Order must be destroyed or re-exported at the expense of the importer unless their disposal otherwise is authorized by a licence issued by the Ministry.

Advantage was taken of the presence in this country of delegates from the French Ministry of Agriculture in connexion with the Franco-British trade negotiations that took place during the early part of 1934 to discuss the provisions of this Order as far as they affected the importation of French produce. As a result of this discussion, and after a careful examination of the latest technical information, it was decided (*a*) that the Ministry would be justified in allowing the importation of raw vegetables (other than potatoes), plants, etc., grown more than 50 kilometres from the nearest point of the boundary of the nearest “zone de

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protection " established by the French authorities against the Colorado Beetle (in place of the radius of 200 kilometres from any outbreak required under the Order of 1933), and (b) that the period during which raw vegetables are admitted without a certificate might be extended generally to April 7 (instead of March 14) and to April 20 in the case of raw vegetables grown in one of the following Departments:—

Loire-Inférieure, Maine-et-Loire, Indre-et-Loire, Indre, Cher, Allier, Saône-et Loire, Jura, or in a Department of France situated to the north of those Departments.

Effect was given to these decisions by the Importation of Plants (Amendment) Order of 1934, which was signed on June 30 and came into operation on the following day.

The number of health certificates accompanying consignments of plants, bulbs, potatoes, etc., received from all sources during the year 1934 showed a slight decrease on the figures for the preceding year, the figures being 32,592 as compared with 34,341 in 1933. The number of uncertified consignments, on the other hand, rose from 240 in 1933 to 289 in 1934. With very few exceptions these uncertified consignments were found to be healthy and were released after examination.

The arrangements that have been in force during recent years for the examination of certified consignments of imported plants, etc., at various ports, were continued during the autumn and winter of 1934. The inspection of nearly 1,000 consignments of plants and bulbs from different countries showed that the great majority were generally healthy and in good condition. In the few cases in which consignments were found to be unhealthy, they were either destroyed or re-exported.

As in previous years, special attention was given to certified consignments of new potatoes from the Canary Islands; and during 1934 it was found necessary to order the destruction or re-export of 2 consignments, comprising 85 packages, by reason of the presence of tubers infested with the larvae of the Potato Moth (*Phthorimæa operculella*).

During the month of July, 1934, a large quantity of potatoes was imported from the Valencia district of Spain. Inspection of these shipments revealed in many instances the presence of the Potato Moth, with the result that it was found necessary to condemn 14 consignments, comprising 22,269 packages.

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Between August, 1934, and January, 1935, some 1,800 consignments of apples imported from North America were sampled and examined. No trace of infestation with the larvae of the Apple Fruit Fly was discovered throughout the season.

Importation of Elm Trees and Conifers (Prohibition) Order of 1933.—This Order, which was made by the Minister by arrangement with the Forestry Commissioners under Section 3 (2) of the Forestry Act, 1919, with the object of preventing the introduction of diseases and pests injurious to elm trees and forest trees, prohibits the landing in England or Wales, from any country other than Scotland, Northern Ireland, the Irish Free State, the Isle of Man or the Channel Islands, of any living plants or parts of plants of the genus *Ulmus* and of the following eight genera of the Order *Pinaceæ*:—*Abies*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga*, *Sequoia*, *Thuja*, and *Tsuga*. The Order also requires that the health certificates prescribed under the Importation of Plants Order of 1933, except in the case of a consignment consisting wholly of potatoes, must include a statement to the effect that the consignment does not contain any plants of the prohibited genera.

Several uncertified consignments of imported plants have been found to contain specimens of some of the prohibited species: these have had to be destroyed or re-exported before the release of the remainder of the consignment has been authorized.

Importation of Raw Cherries Order of 1934.—In the last report (see this JOURNAL, Vol. XLI, No. 9, December, 1934, pp. 863-91) were given particulars of the measures adopted in 1933 to prevent the importation of cherries infested with the larvae of the Cherry Fruit Fly.

On considering the results of the sampling and examination of consignments imported during that year, the Ministry decided that the importation of Spanish cherries, which had hitherto been unrestricted, could be permitted in 1934 only up to the same date as that allowed for French fruit, i.e., May 27.

As regards Italy, a review of the information obtained during a tour of the cherry-growing districts of that country by the Ministry's Horticulture Commissioner in May, 1932, and an examination of the results of the 1933 sampling, convinced the Ministry that a slight extension

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might be granted of the dates up to which the importation of Italian cherries was permitted. In the Order of 1933 the importation of cherries grown in the Region of Emilia had been allowed up to June 16, and from the remainder of Italy up to June 5: for 1934 these dates were extended to June 23 and June 12 respectively.

In other respects, the Importation of Raw Cherries Order of 1934 was in the same terms as the Orders of 1932 and 1933.

The season of 1934 was not so early as that of the previous year, and sampling could not be started until May 22, a week later than in 1933. The first infestation in French fruit was found on May 23, and on the following day a further consignment was found to contain infested fruit. Two further infestations in French cherries were found before general importation ceased.

Seventy-three consignments of Italian cherries were examined between May 22 and June 22. The first infestation was found on May 22, the second on the following day, and others on June 8, after which date no infested fruit was found.

In all, 88 consignments of imported cherries were examined during the season, and, of these, 79 were free from infestation.

PREVENTION OF THE SALE WITHIN THE COUNTRY OF UNHEALTHY MATERIAL FOR PLANTING

Action is taken by the Ministry to prevent the sale within the country of unhealthy material for planting, under the powers contained in the Sale of Diseased Plants Order of 1927, and the Wart Disease of Potatoes Order of 1923. The work under the first of these two Orders is dealt with immediately below; that under the second of these Orders is more conveniently considered in a subsequent section of this Report.

Sale of Diseased Plants Order of 1927.—This Order prohibits the sale for planting, of trees and plants that are substantially attacked by certain scheduled fungus diseases and insect pests, or which bear evidence of having been substantially attacked by the Apple Capsid (*Plesiocoris rugicollis*).

During the year 1934 the Ministry's inspectors paid some 1,500 visits to nurseries, markets and auctions at which

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plants were exposed for sale, and the effect of the Order in maintaining a high standard of health is demonstrated by the fact that only four instances came to light in which action under the Order was necessary:—

(1) Six apple trees entered for sale in a West Country market were substantially attacked by Woolly Aphis: a notice was served requiring the trees to be burnt.

(2) A bundle of black currant bushes exposed for sale in a shop in Bristol was seen to be substantially attacked by "Big Bud": the bushes were withdrawn from sale and a notice was served requiring that they should be burnt.

(3) The stock of a nursery in Somersetshire, which had been advertised for sale by auction, was examined by one of the Ministry's inspectors, who found that some 300 maiden apple trees were substantially attacked by Woolly Aphis. A notice was served requiring that the trees be treated or destroyed: after re-examination, approximately 25 per cent. were found to have been effectively cleaned and their inclusion in the sale was permitted. The remainder were burnt, with the exception of a number supplied to a research station for experimental purposes.

(4) A number of black currant bushes exposed for sale in a Welsh market were noticed to be substantially attacked by "Big Bud." A notice was served on the auctioneers requiring that the bushes be burnt.

PREVENTION OF THE SPREAD OF CERTAIN ESTABLISHED DISEASES

Powers have been taken by the Ministry under the Destructive Insects and Pests Acts to prevent the spread of—and to reduce existing infection by—certain established diseases. These powers are contained in the following Orders:—

The Wart Disease of Potatoes Order of 1923 and Amending Order of 1929.

The Silver Leaf Order of 1923

The Onion Smut Order of 1921

The Wart Disease of Potatoes Order of 1923.—The objects of this Order are to reduce the extent and intensity of Wart Disease in the districts in which it is known to exist, and to prevent its spread to the clean areas in the country.

The main provisions of the Order may be summarized briefly as follows:—

Any occupier of land on which Wart Disease exists or appears to exist must at once report the occurrence.

Potatoes visibly affected with Wart Disease may not be sold or offered for sale.

No potatoes may be planted or sold for planting in England and Wales unless they have been officially certified as having been:—

(a) grown on land believed to be free from Wart Disease, or (b) inspected and that Wart Disease was not found to exist, or (c) inspected whilst growing and found to be of an approved immune variety true to type. The only exception is that a grower does not

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require a certificate in order to plant seed potatoes saved from his previous year's crop grown on the same land.

On land on which Wart Disease has occurred at any time, only those stocks of approved immune varieties that have been officially certified as true to type and reasonably free from rogues may be planted; but a grower may plant seed of approved immune varieties saved from his previous year's crop grown on the same land.

Potatoes grown in an Infected Area may not be planted or sold for planting in land not in an Infected Area. The only potatoes that may be sent out of an Infected Area into other districts are potatoes of approved immune varieties for "ware" purposes, and these must be accompanied by a statement that they are of an approved immune variety, that they were grown in an Infected Area, and that they are not intended for planting.

Potatoes grown in Scotland or Ireland, whether for seed or for consumption, may be sold in England and Wales only subject to certain restrictions also laid down in the Order; potatoes grown outside the British Isles may be planted only by special licence of the Ministry.

(a) *Spread of Infection*.—The number of parishes outside the main infected area in which Wart Disease was recorded for the first time in 1934 was 3 as compared with 11 in 1933, 20 in 1932 and 24 in 1931. No outbreak was recorded until September 3, a date nearly two months later than that of the first outbreak in 1933. There appeared to be little doubt that the outbreaks were due to previous contamination of the soil.

(b) *Infected Areas*.—24 new outbreaks were reported in 1934 from parishes within the Infected Areas, as compared with 21 in 1933, 37 in 1932 and 94 in 1931. As in previous years, special attention has been given to the potato crops grown in districts bordering on the Infected Areas, but there has been no reason to consider any extension of the boundaries of those areas.

(c) *Certification of Potatoes*.—The Order requires that all potatoes used for planting in England or Wales (except "own saved" seed) shall be the subject either of a Clean Land (C.L.) or True Stock (T.S.) certificate, the number of which must be quoted in all transactions in seed potatoes. Clean Land certificates can as a rule be issued from the Ministry's offices immediately on receipt of the application, but where a district within or bordering on the Infected Areas is involved, the crop must be inspected before the certificate can be issued. True Stock certificates are issued only in respect of varieties that have been approved by the Minister as being immune from Wart Disease. Inspections for these certificates are dealt with in

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the section on the inspection and certification of growing crops (see p. 911).

Particulars of the certificates issued under the Order during the past three years are as follows:—

	1932 <i>crop</i>	1933 <i>crop</i>	1934 <i>crop</i>
<i>Clean Land</i>			
No. of certificates issued	3,857	3,863	3,631
Acreage	58,917	57,247	54,321
<i>True Stock</i>			
Acreage certified	3,395	3,866	2,866

(d) *Planting of Imported Potatoes*.—It was mentioned in the last report that licences had been issued under Art. 11 of the Order authorizing the planting during 1934 of some 250 tons of Dutch potatoes of a variety claimed to be specially suitable for the manufacture of potato “crisps.” The crops grown from this seed were examined by the Ministry’s inspectors during the growing and lifting season, and were found to be generally healthy and free from disease.

Licences were issued authorizing the planting during 1935 of some 190 tons of Dutch seed potatoes of the same variety, and arrangements were made by one of the importing firms for some of this seed to be grown under the supervision of the Cumberland Seed Potato Growers’ Association with the object of building up healthy home-grown stocks of this variety.

(e) *Legal Proceedings*.—Since the date of the last report, legal proceedings have been taken in respect of the following contraventions of the Order:—

(1) Selling, for planting, potatoes that were not the subject of the certificate prescribed in Art. 8 of the Order, and making a statement for the purposes of the Order which was false in a material particular. The defendant, who had been previously convicted of similar offences under the Order, pleaded guilty, and was fined £20 on each charge, with £4 4s. 6d. costs.

(2) Causing potatoes grown in an Infected Area to be consigned to a place not within an Infected Area. The defendants, who pleaded guilty, were fined the maximum penalty of £10 (for a first offence) with 7s. 6d. costs.

Wart Disease of Potatoes (Amendment) Order of 1929.—This Order was made with the object of providing an additional safeguard against the appearance of Wart Disease in the areas around Boston and Wisbech, in which are grown most of the potatoes intended for export purposes. The Order is operative within a district comprising the administrative County of Lincoln (Parts of Holland)

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including the Borough of Boston, the Petty Sessional Division of Wisbech and the Borough of Wisbech (Isle of Ely), and the Petty Sessional Division of Freebridge Marshland and the Borough of King's Lynn (Norfolk). Within this district no one may plant any potatoes, except certified stocks of approved immune varieties, in allotments not exceeding $\frac{1}{4}$ of an acre or in private gardens. No restrictions are, however, placed on the planting of potatoes of immune varieties saved from the crop grown on the same land in the previous year, or of the following five early varieties that are not immune from the disease: "Sharpe's Express," "Eclipse," "Epicure," "May Queen," and "Duke of York."

The requirements of the Order are now becoming generally known throughout the district concerned, and contraventions have been comparatively few. Warning letters have been addressed to occupiers infringing the regulations, but no legal proceedings have been instituted.

Potato Testing Station.—Previous reports have given particulars of the arrangements made by the Ministry for trials of new varieties of potatoes made with the object of determining their immunity from or susceptibility to Wart Disease; these trials are carried out each year at the Potato Testing Station of the National Institute of Agricultural Botany at Ormskirk, Lancashire, and are co-ordinated with the results of trials at Edinburgh and Kilkeel by the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland respectively.

In 1934, the number of stocks included in the second and subsequent years' tests was 46, none of which developed Wart Disease. Of the 43 entries for the first year's tests, 2 were too poor to judge, but the remaining 41 were distinct varieties; 3 became infected in the field. (This is the first year since the trials were instituted in which no synonyms of existing varieties were submitted.) Thirty-six new varieties were recommended for approval as the result of the 1934 trials, but only 2 of these have yet been added to the approved list. In order to avoid the publication of the names of varieties of which stocks may not be available it is the practice of the Ministry not to add any new varieties to the approved list until the raisers have intimated that the varieties have actually been, or will shortly be, introduced into commerce.

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Silver Leaf Order of 1923.—With the object of preventing the spread of Silver Leaf Disease, this Order requires that all dead wood of plum or apple trees must be removed and burnt before July 15 in each year. The requirements of the Order were found to be carried out generally in a satisfactory manner and in no instance was it necessary to resort to legal proceedings against occupiers for failure to comply with the Order, although during the twelve months ended December 31, 1934, more than 900 visits were made by the Ministry's inspectors acting under the Order.

Judging from the reports received by the Ministry, the disease was not so prevalent during 1934 as in the preceding year, although reports of the general presence of fructifications of *Stereum purpureum*, the fungus that causes Silver Leaf, were received from the eastern part of the country during the early spring and late autumn.

Onion Smut Order of 1921.—This Order prohibits, *inter alia*, the planting of onions or leeks in infected soil except under licence. For several years it has been the practice of the Ministry to restrict the issue of licences to exceptional cases where little serious risk of spreading the disease is likely to be involved by the concession. The effectiveness of the Order is demonstrated by the fact that after 15 years only twenty outbreaks of Onion Smut are known to exist throughout the whole of England and Wales; these are distributed as follows: Northumberland 10, Durham 2, Westmorland 1, Lancashire 1, Worcester 2, Northampton 2, Huntingdon 1, Suffolk 1. No fresh cases of the disease were discovered during 1934.

ERADICATION OF PESTS NOT ESTABLISHED IN THE COUNTRY

The Ministry acts for this purpose under and by virtue of two Orders, viz.: the Colorado Beetle Order of 1933, and the Destructive Insects and Pests Order of 1933.

Colorado Beetle Order of 1933.—This Order provides that the occupier of any land on which the Colorado Beetle exists or is suspected of existing shall at once notify the Ministry. It authorizes an inspector to enter upon and examine any crop upon any land on or in the vicinity of which he has reason to believe that the beetle exists. The Order further empowers an inspector or other authorized

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person to enter any place that has been declared to be an infected place under the Order and to take such steps as he may think expedient for preventing the spread of the beetle. Some other powers are given in respect of any land to which in the opinion of an inspector the beetle is likely to spread from an infected place. Occupiers of land are required to render all reasonable assistance and facilities to the inspector in the discharge of his duties. Any person wilfully obstructing or impeding an inspector in the exercise of his powers or failing to comply with or acting in contravention of the Order or any notice thereunder, is liable to a penalty.

The Outbreak at Tilbury.—The last report included particulars of the operations carried out during the autumn and winter of 1933 following the discovery of specimens of the Colorado Beetle at Tilbury in August of that year. It will be remembered that as the result of the inspection of the soil of allotments and gardens in the vicinity of the original infected place several specimens of the beetle were found on both sides of the river, and that nineteen additional "infected places" were declared.

The work of soil-inspection and fumigation with carbon-disulphide was continued until May 2, 1934.

The operations for the summer of 1934 started on May 28, when a force of inspectors commenced the examination of all potatoes within a ten-mile radius of the infected places, and a more general inspection of crops in Essex and Kent beyond the ten-mile radius. This field inspection, which covered over 9,000 acres of potatoes, was repeated during the month of August.

It had previously been decided that all crops within approximately six miles of any of the infected places should be sprayed with an arsenical wash: this was done between June 5 and July 5. When spraying was started many crops of late varieties were barely above ground, although some of the early varieties were almost ready for lifting. Consequently, the whole district had to be gone over twice, and this fact added considerably to the work and greatly prolonged the period of operations. In all, 4,033 acres of field crops were sprayed by the Ministry's contractors—1,759 acres in Essex and 2,274 in Kent.

In addition to the field crops, all potatoes growing in allotments and gardens in the vicinity of the infected places

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were sprayed under the direct supervision of the Ministry's officers. As there were objections to the use of a poisonous spray under the conditions obtaining in allotments and gardens, a Derris insecticide was used instead of the arsenical mixture employed for field crops.

The first evidence of the presence of living beetles was the discovery on May 16 of a single specimen on one of the infected places at Tilbury. No further beetles were found either on the other infected places or on adjacent potato crops until July 6, when one other specimen was observed near one of the infected places in Essex. The crops in the neighbourhood were thoroughly re-examined but no other beetles could be found.

It can, therefore, be stated that no place in England or Wales is now definitely known to be infested with the Colorado Beetle. Districts in which beetles have been found must of course be regarded as under suspicion for some time to come, and potato crops will be kept under careful observation. No further indications of the continued existence of the pest were found during 1935, and precautionary spraying was, accordingly, regarded as unnecessary.

Destructive Insects and Pests Order of 1933.—This Order prohibits the keeping, sale or release in any stage of its existence of any insect of a non-indigenous species except under licence from the Ministry. "Insect" as defined in the Order, includes bacteria and other vegetable or animal organisms, and any agent causative of a transmissible crop disease; "a non-indigenous species" is defined as a species or kind which is destructive to agricultural or horticultural crops or to trees or bushes, and which at the date of the commencement of the Order was not established in Great Britain.

Inspectors of the Ministry are empowered to enter any premises on which they may have reason to believe that any such insect is kept or that there are any plants attacked by any such insect, and may serve notices requiring measures to be adopted for the prevention of the spread of the insect.

It was not found to be necessary to take any action under this Order during the year 1934, and no licences were issued.

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ORDERS ADMINISTERED BY LOCAL AUTHORITIES

The Orders described in this section do not entail action by the Ministry, but were made at the request of the local authorities concerned in order that they might have powers to deal with complaints from growers in their districts to the effect that diseases and pests from neighbouring plantations were infecting their orchards.

It was mentioned in the last report that, in April, 1933, a circular letter was addressed to the local authorities of the more important fruit-growing counties calling their attention to the Fruit Tree Pests Orders that were in force in Norfolk and the Isle of Ely, and suggesting that they might like to consider whether similar Orders would serve a useful purpose in their own districts. As the result of that letter a similar Order operative within the county of Cambridge was made in 1934. Since the end of that year Orders applicable to the counties of Kent, Berks, Bucks and Middlesex have been made. Such Orders are therefore now in force in seven counties representing some 40 per cent. of the fruit acreage of the country, and applications have been made for several further Orders

Blackcurrant Mite (Norfolk) Order of 1928.—This Order, which applies to the Administrative County of Norfolk and the County Borough of Great Yarmouth, enables officers appointed by the Local Authority for the purposes of the Order to investigate cases in which growers of blackcurrant bushes complain that bushes growing on other premises within the district are likely to cause "Big Bud" to spread to their own bushes. If the Local Authority are satisfied that the complaint is justified, the owner of the affected bushes may be required to cut down and destroy all affected branches, or to treat the bushes in a prescribed manner. During 1934 notices were served on 2 occupiers requiring the treatment of their bushes. One occupier carried out the prescribed spraying and pruning: the other occupier uprooted and burnt the bushes.

Fruit Tree Pests (West Norfolk) Order of 1931.—This Order, which applies to the important fruit-growing area of the County lying within the petty sessional divisions of Freebridge Marshland and Clackclose, follows the main lines of the Blackcurrant Mite (Norfolk) Order of 1928. It enables officers appointed by the Local Authority for the purposes of the Order to investigate within the scheduled district cases in which growers of fruit trees complain that fruit trees growing on other premises within the district are likely to cause the spread to their own trees of the following diseases or pests:—fruit tree cankers, brown rots, Apple and Pear Scab, fruit tree aphides, Apple Sucker, Winter Moth, Codling Moth, fruit tree Capsid Bugs, and fruit tree Red Spiders. If the Local Authority are satisfied that the complaint is justified, the owner of the affected trees may be required to cut out and burn all affected branches or to treat the trees in a prescribed manner.

During 1934 Notices were served on 3 occupiers requiring them to spray affected trees; the requirements of the notices were obeyed in all 3 instances.

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Fruit Tree Pests (Wisbech District) Order of 1931.—This Order, which is in similar terms to the Fruit Tree Pests (West Norfolk) Order of 1931, was operative only within the petty sessional division and borough of Wisbech. After three years' experience of the working of the Order within this limited area the Local Authority decided that it would be of advantage if the provisions of the Order were operative throughout the whole of their jurisdiction.

In accordance with their request, the Fruit Tree Pests (Isle of Ely) Order of 1934 was made on June 25, 1934, extending as from July 1, the provisions of the earlier Order to the whole of the administrative county of the Isle of Ely.

The Local Authority did not find it necessary to take any action under these Orders during 1934.

Fruit Tree Pests (Cambridgeshire) Order of 1934.—This was the first Order to be issued as the result of the circular letter addressed in April, 1933, to the most important fruit-growing counties. The Order, which is operative within the county and borough of Cambridge, was made on November 26, 1934, and came into operation on December 1, 1934.

Apple Capsid (Essex) Orders of 1932 and 1934.—These Orders were made at the request of, and are administered by, the Essex County Council; they are operative within the administrative county of Essex, including all the county boroughs and boroughs.

The Orders require any person, other than a private grower, as defined in the principal Order, who receives any apple trees or gooseberry or currant bushes for planting, or for sale for planting, or any scions, cuttings or other woody parts of apple trees or gooseberry or currant bushes for propagation or for sale for propagation, to notify the fact to the Local Authority. Officers appointed by the Local Authority are empowered to enter any premises in the district and examine any apple trees or gooseberry or currant bushes, and the Local Authority on being satisfied that the Apple Capsid exists on any such trees and bushes may require the occupier to carry out any prescribed treatment.

During 1933 notices were served on 20 occupiers requiring their trees to be treated during the early part of 1934. In two instances the prescribed treatment proved effective and no apple capsids were found when the orchards were examined during the summer. In the remaining 18 instances further notices were served requiring the treatment to be repeated early in 1935. Similar notices were served in six additional cases where the Apple Capsid was found in 1934.

Bulb Diseases (Isles of Scilly) Orders of 1923 and 1924.—These Orders, which were made at the request of the bulb growers of the Scilly Isles, with the object of preventing the introduction of eelworm and other pests and diseases of bulbs, prohibit the entry of daffodil and narcissus bulbs into the Islands unless they are (1) officially certified as healthy, or (2) subjected to the warm-water treatment before shipment, or (3) consigned to the Bulb Treating Station at St. Mary's, there to be submitted to the warm-water treatment before being handed over to the ultimate consignees.

During the year 1934, seven licences were issued for the consignment of daffodil and narcissus bulbs from England to the Bulb Treating Station at St. Mary's; five consignments were examined and certified as healthy.

ASSISTANCE TO THE EXPORT TRADE IN NURSERY STOCK, POTATOES, ETC.

(a) **General.**—Most countries require that imported plants, potatoes, etc., shall be accompanied by some form of

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health certificate involving an inspection of the consignment before export. Although differing in details, the various regulations laid down by countries importing plants from Great Britain usually involve a critical examination by one of the Ministry's inspectors, normally on the premises of the grower or exporter, of the material for export, before a certificate in the prescribed form can be issued; such a certificate generally implies that the consignment was found to be healthy and free from injurious pests and diseases. The trade in the export of nursery stock, plants, bulbs, potatoes, etc., is an important item in the horticultural industry, and it is satisfactory to record that growers in all parts of the country realize the importance of maintaining the high reputation for health now generally associated with British plants; the number of consignments that fail to reach the requisite high standard of health is extremely small.

(b) Nursery Stock, etc.—The number of certificates (including *Phylloxera* certificates) issued in respect of consignments of nursery stock, etc., exported from England and Wales, in each of the last four years, and the total estimated value of the consignments concerned, are as follows:—

Year.	No. of Certificates	Value (£).
1931	5,346	49,670
1932	4,891	33,348
1933	4,211	27,108
1934	4,489	34,175

The total consignments certified for export in 1934 included bulbs valued at £6,000, manetti stocks (£3,300) and orchids (£11,300).

(c) Potatoes.—Appreciable quantities of English potatoes are consigned annually to Spain, Algeria, Portugal, the Channel Islands, the Canary Islands, and French Morocco; smaller quantities are consigned to France, Argentina, Uruguay and Egypt. Normally the trade consists mainly of seed potatoes; but in some years low yields abroad, especially in the countries of the South American continent, lead to a demand for ware potatoes.

Details are given in the following table of the quantity and value of the potatoes certified for export for the years 1931-34:—

Year.	Tons.	Value (£).
1931	25,949	147,882
1932	33,048	187,098
1933	25,056	85,937
1934	24,834	118,622

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In 1934, some 17,500 tons of seed potatoes were sent to Spain and Algeria, 1,420 tons to French Morocco, 950 tons to the Canary Islands; the remainder were sent to Uruguay, Portugal, France, Argentina, Egypt and the Channel Islands. The value of the potatoes exported averaged £4 15s. per ton as compared with £3 8s. per ton in 1933 and £5 13s. per ton in 1932.

ASSISTANCE TO GROWERS TO OBTAIN RELIABLE MATERIAL FOR PLANTING

Inspection and Certification of Growing Crops.—The voluntary schemes for the inspection and certification of potatoes, strawberry plants, blackcurrant bushes and narcissus stocks were continued during the year. The inspections are carried out during the growing season by the Ministry's horticultural inspectors, who are specially trained in the identification of the varietal characteristics and disease symptoms of the crops with which they deal. At the close of the inspection season, registers containing the names and addresses of growers whose stocks have reached the requisite standard of purity and general health are issued; the demand for these registers by would-be purchasers of certified stocks shows a steady increase each year.

Potatoes.—With the object of making available to potato growers generally, and especially to those who have land infected with Wart Disease, supplies of seed potatoes of approved immune varieties reasonably free from rogues, the Ministry in 1918 introduced the first of its purity inspection and certification schemes for growing crops of potatoes. In 1924, after numerous requests from growers, these schemes were extended to susceptible varieties of potatoes. Their conditions (under which certificates are issued for stocks reaching a standard of purity not lower than 99·5 per cent.) have remained broadly unchanged during their period of operation.

The acreages of approved immune and susceptible varieties of potatoes inspected and certified, and the number of certificates issued in each of the last four seasons, are given in Table I.

The total area inspected in 1934 (5,596 acres) was over 1,400 acres less than the area dealt with in 1933; the decrease in the area examined is mainly in respect of immune varieties, the area of susceptible varieties showing only a small decrease.

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TABLE I

Year	Immune Varieties			Susceptible Varieties		
	Inspected	Certified	No. of Certificates issued	Inspected	Certified	No. of Certificates issued
	acres	acres		acres	acres	
1931	2,609	2,309	602	2,199	1,937	526
1932	3,956	3,395	841	2,931	2,605	684
1933	4,342	3,866	902	2,669	2,421	740
1934	3,220	2,866	727	2,370	2,174	608

The acreage that reached the required standard of purity of 99·5 per cent. in 1934 represented about 90 per cent. of the total area inspected, the same as in the previous season; the corresponding figure for 1932 was 87 per cent. In the "immune" section "Majestic" further consolidated its position as the most popular variety, with 1,220 acres representing about 43 per cent. of the total area certified as compared with 33 per cent. in 1933; "Great Scot" with 608 acres and "Kerr's Pink" with 356 acres came next in importance. In the susceptible section "King Edward" with 1,497 acres certified, or 69 per cent. of the total area, again occupied the first place; "Eclipse," 147 acres, "King Edward (Red Type)," 134 acres, and "Sharpe's Express," 121 acres, were the only other susceptible varieties with more than 100 acres certified.

Strawberry Plants.—Under this scheme, stocks of strawberry plants from which it is proposed to take runners for sale, are inspected for the purpose of certification if found true to type and reasonably free from rogues. During the year a few minor changes were introduced in the conditions of the scheme as a result of the experience gained in previous seasons. Applications were received from 137 growers in respect of 342 acres of strawberry plants. This was a satisfactory advance on the three previous seasons, comparing well with the record season of 1930, when 141 applications were dealt with, covering 395 acres. As in previous years, the Wisbech area of the Isle of Ely, Lincs (Holland), and Norfolk furnished most of the applications; in 1934 this district, which is now recognized as the principal centre in this country for the production of strawberry runners, accounted for about 70 per cent. of the total area submitted.

Particulars of the number of stocks and acreage for each variety covered by the applications are given in Table II

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(similar information for the two previous seasons is given for comparison).

TABLE II

Variety	1932		1933		1934	
	No. of Stocks	Acreage	No. of Stocks	Acreage	No. of Stocks	Acreage
Bedford Champion . .	3	0·6	3	0·4	10	5·3
Deutsch Evern . . .	—	—	—	—	5	3·6
Jucunda	1	0·5	2	0·4	1	0·1
Leader	2	0·4	1	0·1	1	0·1
Madame Kooi	7	2·7	5	0·9	12	4·3
Madame Lefebvre . .	13	5·1	9	3·8	38	19·3
Oberschlesien . . .	48	57·8	25	26·7	92	99·4
Royal Sovereign . . .	47	55·3	43	82·0	103	159·6
Sir Joseph Paxton . .	22	25·7	16	18·6	24	24·4
Stirling Castle . . .	3	3·2	2	2·2	2	0·6
Tardive de Leopold . .	17	6·1	17	5·7	30	22·8
The Duke	9	4·1	7	3·4	9	4·2
The Laxton	3	0·7	3	0·4	2	0·6
	175	162·2	133	144·6	329	342·3

It will be seen that Royal Sovereign with 159·6 acres accounted for nearly 50 per cent. of the total acreage inspected, whilst Oberschlesien with 99·4 acres came next in importance; the areas of these varieties examined last season were greater than in any year since the introduction of the scheme. Of the total area of 342·3 acres entered for inspection, 308·2 acres qualified for certification. The acreage certified represents 90 per cent. of the total area inspected; although this figure compares unfavourably with 1933 and 1932 when 97 per cent. and 93 per cent. were passed, in view of the greatly increased area dealt with and the large number of new growers concerned it is not unsatisfactory. Owing to the continued drought the season proved unusually difficult for growers, and several stocks that in a normal growing season might have qualified for certificates, were rejected owing to lack of vigour.

An analysis of the inspections is given in Table III.

Black Currant Bushes.—In previous seasons, certificates issued under this scheme were to the effect that the stocks at the time of inspection were found to be true to type and apparently free from Reversion; experience had shown, however, that the mere removal of visibly reverted black-currant bushes was not a sufficient safeguard to the purchaser of certified stocks, as Reversion might be present

EDUCATION AND RESEARCH REPORT—III

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(similar information for the two previous seasons is given for comparison).

TABLE II

Variety	1932		1933		1934	
	No. of Stocks	Acreage	No. of Stocks	Acreage	No. of Stocks	Acreage
Bedford Champion ...	3	0·6	3	0·4	10	3·3
Deutsch Evern ...	—	—	—	—	5	3·6
Jucunda ...	1	0·5	2	0·4	1	0·1
Leader... ..	2	0·4	1	0·1	1	0·1
Madame Kooi... ..	7	2·7	5	0·9	12	4·3
Madame Lefebvre ...	13	5·1	9	3·8	38	19·3
Oberschlesien... ..	48	57·8	25	26·7	92	99·4
Royal Sovereign ...	47	55·3	43	82·0	103	159·6
Sir Joseph Paxton ...	22	25·7	16	18·6	24	24·4
Stirling Castle ...	3	3·2	2	2·2	2	0·6
Tardive de Leopold ...	17	6·1	17	5·7	30	22·8
The Duke ...	9	4·1	7	3·4	9	4·2
The Laxton ...	3	0·7	3	0·4	2	0·6
	175	162·2	133	144·6	329	342·3

It will be seen that Royal Sovereign with 159·6 acres accounted for nearly 50 per cent. of the total acreage inspected, whilst Oberschlesien with 99·4 acres came next in importance; the areas of these varieties examined last season were greater than in any year since the introduction of the scheme. Of the total area of 342·3 acres entered for inspection, 308·2 acres qualified for certification. The acreage certified represents 90 per cent. of the total area inspected; although this figure compares unfavourably with 1933 and 1932 when 97 per cent. and 93 per cent. were passed, in view of the greatly increased area dealt with and the large number of new growers concerned it is not unsatisfactory. Owing to the continued drought the season proved unusually difficult for growers, and several stocks that in a normal growing season might have qualified for certificates, were rejected owing to lack of vigour.

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Black Currant Bushes.—In previous seasons, certificates issued under this scheme were to the effect that the stocks at the time of inspection were found to be true to type and apparently free from Reversion; experience had shown, however, that the mere removal of visibly reverted black-currant bushes was not a sufficient safeguard to the purchaser of certified stocks, as Reversion might be present

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TABLE III

Variety	Certified		Not Certified			
	No. of Stocks	Acreage	No. of Stocks	Acreage		Total
				Rogues exceeding 1 per cent.	Lack of vigour	
Bedford Champion...	9	2.8	1	—	0.5	3.3
Deutsch Evern ...	5	3.6	—	—	—	3.6
Jucunda ...	1	0.1	—	—	—	0.1
Leader ...	1	0.1	—	—	—	0.1
Madame Kooi ...	12	4.3	—	—	—	4.3
Madame Lefebvre ...	34	16.5	4	0.5	2.3	19.3
Oberschlesien ...	75	83.1	17	13.5	2.8	99.4
Royal Sovereign ...	99	156.6	4	2.0	1.0	159.6
Sir Joseph Paxton ...	21	20.4	3	0.8	3.2	24.4
Stirling Castle ...	2	0.6	—	—	—	0.6
Tardive de Leopold...	28	17.3	2	5.5	—	22.8
The Duke ...	7	2.2	2	0.5	1.5	4.2
The Laxton...	2	0.6	—	—	—	0.6
	296	308.2	33	22.8	11.3	342.3

in a latent state and would not become apparent until the bushes were grown on in the following season. For these reasons the conditions of the scheme were modified for 1934; any certificate issued related solely to the purity of the stock, and did not imply any guarantee that the bushes to which it applied were free from Big Bud or from Reversion, although no certificates were issued in respect of stocks bearing evidence of being or having been substantially attacked by either of these ailments.

Applications were received from 28 growers for the inspection of about 407,500 bushes; in 1933 there were 19 applications in respect of about 311,000 bushes.

Bushes attaining the requisite standard of health and vigour are normally classified for certification purposes into the four main group types adopted by the East Malling Research Station, namely, French Black, Boskoop Giant, Edina and Baldwin, any varietal names given by the applicants being inserted in brackets. Some varieties have not yet been classified in any of these groups, and in such instances the stocks are certified true to variety. Table IV shows the number of bushes of each type inspected and certified during the past three seasons.

Certificates were granted for only 78 per cent. of the bushes inspected; the percentage of bushes rejected (22) is

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TABLE IV

	1932		1933		1934	
	Inspec- ted.	Certi- fied	Inspec- ted	Certi- fied	Inspec- ted	Certi- fied
French Black	70,008	65,508	57,170	57,170	66,720	50,320
Boskoop Giant	32,770	32,420	37,880	34,880	44,530	33,230
Edina ..	18,798	16,798	10,700	10,700	24,130	21,580
Baldwin ..	80,230	78,980	86,700	86,700	181,710	148,910
Unclassified Varieties ..	79,698	74,698	118,448	117,848	90,448	64,298
	281,504	268,404	310,898	307,248	407,538	318,338

the highest since the introduction of the scheme, and compares with 2 per cent. in 1933, 5 per cent. in 1932 and 8 per cent. in 1931. Of the stocks that inspectors were unable to certify 26,450 bushes were rejected on account of the presence of rogues exceeding 1 per cent., 36,400 because of substantial attack by Reversion, 21,450 owing to the presence of a number of weak plants or to a general lack of vigour, while some 4,900 bushes, 6 years old, were too large to certify.

Narcissus Stocks.—This scheme provided for the inspection of growing crops of narcissi for the purpose of their certification if found true to type and reasonably healthy. Inspections had particular reference to the purity of the stocks, and any certificate issued related solely to the purity of the stocks and not to their freedom from disease; careful watch was kept, however, for stocks obviously unhealthy or lacking in vigour, and when these were found they were not certified.

In the light of the experience gained in 1933, the conditions of the scheme were slightly modified. In 1933 provision was made for the examination of some 20 of the principal varieties of narcissi, and special arrangements were also made for the inspection of less well-known varieties; insignificant quantities of many varieties were submitted under this special arrangement. In 1934, with the object of confining the scheme to varieties available in commercial quantity these special facilities were withdrawn; and it was decided to accept applications for the inspection of stocks of any variety of narcissi provided that not less than 1/10th acre (approximately 15,000 bulbs) of each variety included in the application was submitted.

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The acreage inspected in 1934 was considerably more than double that dealt with in the previous year; 34 applications, 16 of which came from "new" growers, were received for the inspection of approximately 220 acres of narcissus as compared with 29 applications in respect of about 98 acres in 1933. These applications came from most of the principal bulb-growing areas, Holland (Lincs) with 138 acres, or 62 per cent. of the total area submitted, being easily first. The area submitted under the scheme is, however, only a small percentage of the acreage devoted to the production of "dry" narcissus bulbs in this country.

The field inspections, which commenced in the West of England in the second week of March, were not completed in Lincolnshire until the end of April; some 311 stocks covering 98 different varieties were examined, as compared with 268 stocks and 130 varieties in 1933. Some 200 acres, or approximately 90 per cent. of the total area examined, were certified. The classification of certified stocks followed the classification of the Royal Horticultural Society; Trumpet Daffodils with 119 acres were easily the most popular, the principal varieties being "Emperor," "Golden Spur," "King Alfred" and "Princeps"; Poeticus varieties with nearly 37 acres in which the well-known "Pheasant's Eye" was prominent; and Incomparabilis with 27 acres in which "Sir Watkin" accounted for 22 acres, were also well supported groups. These were followed by Barrii with 17 acres and Double varieties with 9 acres.

Trials of Hardy Fruits for Commercial Purposes.—The scheme for the testing of new varieties of fruit trees which is conducted by a joint committee of representatives of the Ministry and the Royal Horticultural Society was continued during the year. An account of these trials was published in the Report for the year 1932-33.

Information on the Condition of Fruit and Vegetable Crops and Forward Estimates of Yields

At a meeting of the Horticultural Advisory Council held in December, 1933, a sub-Committee of the Council was appointed to consider and advise what fruit, flower and vegetable crops should be included in the Ministry's scheme of reports on horticultural crops, the districts from which such reports should be obtained, and the periods during

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which such reports should be published. The sub-committee, which reported early in 1934, expressed its appreciation of these reports and its satisfaction with the arrangements made for the collection of the information; it suggested the discontinuance of reports on certain vegetable and flower crops, and slight modifications in the form of the reports on fruit crops, and in the periods and districts covered by the reports. The sub-committee's recommendations, with certain minor amendments, were accepted and put into operation in April, 1934.

Reports on the condition of the principal horticultural crops were issued each month; from October to March on flower and vegetable crops of seasonal interest; and during the summer months on the chief fruit and vegetable crops. Forward estimates of the probable yield of gooseberries, strawberries, raspberries, blackcurrants, cherries, plums, damsons, early cooking apples and apples of the Worcester Pearmain, Bramley's Seedling, Cox's Orange Pippin, and cider varieties were issued at the appropriate seasons. These reports now receive wide publicity in the horticultural press and elsewhere, and there is at present a keen demand for this information from all sections of the horticultural and allied industries and from abroad; some hundreds of copies of the reports are circulated monthly by the Ministry during the summer months.

Cider Industry : Replanting of Cider Orchards

For several years before the War few cider-apple trees were planted—not nearly enough to replace the natural losses among the older trees. The advance in popularity of cider as a beverage amongst all classes of the community, and the development of the cider industry since the War, have indicated very clearly the present deficiency of the home supplies of cider fruit, have focussed attention on the aged and derelict condition of a large number of cider orchards in the West of England, and have shown how necessary it is that growers and cider manufacturers should combine to increase home supplies of cider apples, and render the industry less dependent on supplies from foreign countries.

The establishment of new cider orchards and the rehabilitation of existing orchards involve considerable capital outlay; but it is satisfactory to record that, largely as the result of the joint efforts of the Ministry, the University

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of Bristol National Fruit and Cider Institute, the various county agricultural education authorities in the West of England cider districts, and the National Association of Cider Makers, means have been devised to encourage replanting, and to accelerate the production of cider apples. This replanting movement, from various economic causes, has been somewhat slow to develop; it has now, however, reached very considerable dimensions, although there is still much to be done. Amongst the various measures taken may be mentioned the recommendation of the Executive Committee of the National Association of Cider Makers to its members to enter into contracts with growers of cider fruit providing for a minimum price of £4 per ton to be paid by Cider Manufacturers during a period of five years commencing in 1932; such a contract, by giving the progressive grower a definite sense of security encourages him to increase his plantings and improve the condition of his orchards. A well-known Herefordshire firm of cider makers has undertaken the raising of young cider trees in its own nurseries and has offered them to farmers on attractive deferred payment terms; more than 50,000 young trees or over 1,000 acres, have been planted in Herefordshire under this scheme. In Devonshire the county Federation of Cider-makers in 1933 introduced a scheme under which, for every ton of fruit consigned to members of the Federation in the three years 1933-35, a cider tree is given without charge to the farmers supplying the fruit; already more than 43,000 young trees have been planted under this scheme. In addition, some of the large firms of cider makers have acquired land for the establishment of new orchards to serve their own requirements. The full effect of all these new plantings cannot, of course, be felt until the trees begin to produce crops some ten years hence.

At the same time the National Fruit and Cider Institute, and the various county agricultural education authorities concerned, have strengthened their educational efforts on orchard planning and management. Such education is often very necessary. They have advised that the collections of heterogeneous sorts of apples found in many cider orchards should be replaced by groups of varieties as limited in number as circumstances will allow, and each variety should be of a high-grade of merit from both orchard and vintage points of view. A radical improvement in the methods of harvesting the fruit is also required.

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Finally, much attention is being given at the National Fruit and Cider Institute, and in the counties concerned, to the economic possibility of improving the standard of hygiene in cider orchards. Owing to the lower value of vintage fruit the treatment of such orchards for pest and disease control is an entirely different matter from the treatment of orchards producing dessert and culinary apples; the cider orchard grower cannot afford heavy spraying expenditure, and until recently a cider orchard was rarely sprayed. Following successive crop failures (due largely to pests and disease) investigations have been made to ascertain whether any improvement can be effected by carrying out a modified spraying programme, and these have clearly shown that, in the older orchards particularly, a marked improvement can be obtained by such means.

THE WORKING OF THE SEEDS ACT, 1920, IN THE SEASON, 1934-35

THE Seeds Act, 1920, has now been in operation for 14 years, and during that period the Ministry of Agriculture and Fisheries, which is responsible for the administration and enforcement of the Act, has been continuously engaged in bringing the provisions of the Act to the notice of all sellers of seed and in securing compliance, as far as possible, with the Act's requirements.

The measure of success achieved may be gauged by the satisfactory nature of the annual reports in recent years, and it may perhaps be too readily assumed therefrom that the necessity for such careful oversight as has hitherto been undertaken does not now exist. While, however, it can be reported once again that the season's operations under the Seeds Act have been satisfactory and fairly free from serious infringements, yet the principle still holds that the price of liberty is unremitting vigilance. The inspection work undertaken by the Ministry during the season revealed a noticeable increase in the number of minor irregularities reported, and, while it is not suggested that this increase is serious, it indicates the necessity for continued alertness in the "policing" of the Act.

The steady decline in the number of whole-time retail dealers in agricultural and garden seeds, which has been a marked feature in recent years, appears to persist, but there has again been a considerable increase in the number of retailers selling packeted seeds, usually as agents of the large firms specializing in the packet trade. The influx of retail sellers is well illustrated from the records of one particular area in the southern counties, where a comparison with the position as it was six years ago reveals that nearly one-half the present number of seed sellers were not in the business at the earlier date.

Fortunately the Ministry's responsibilities under the Act are lightened by the general readiness of traders to rectify inaccuracies and remedy omissions when their attention is drawn to them. It is only in the small minority of cases that, owing to flagrant neglect or deliberate violation of the requirements of the Act and Regulations made thereunder, more serious measures are necessary.

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Visits to Seedsmen.—During the year under review inspectors made some 4,900 calls upon seed sellers of all kinds throughout the country. These visits included over 900 to sellers who were new to the trade in their particular district and had not previously been visited there. As against these new sellers discovered by inspectors it is interesting to note that only about 400 sellers were found to have given up business this season. These figures relate only to districts that the inspectors were able to visit during the year, but they emphasize what has already been stated as to the increasing number of sellers who, in these days, deal mainly in packeted seeds. As far as the retail agricultural seedsmen is concerned it is evident that, in some areas at any rate, he has been partially superseded by the agent who carries no stocks and issues no catalogue, but secures his orders by personal contact with the farmer and merely passes on the orders to his principal for delivery direct to the customer.

The particulars that the Act requires shall be declared on sale of seeds are usually given by seedsmen in the relative sale note or invoice, but some seedsmen use their catalogue for the purpose of making the statutory declaration. This is not an altogether satisfactory method. In many instances it is found that there is failure to make a reference to the catalogue on the invoice, and, with grass and clover seed mixtures particularly, it is frequently found impossible to correlate the information in the catalogue with the separate items in the mixture.

Reference must also be made to the fact that a number of seedsmen still seem to be ignorant of requirements in respect of the sale of cereal seeds. There is far too frequent failure to deliver to purchasers of cereal seeds a statement that the seeds have been tested in accordance with the provisions of the Act, and to give particulars of the percentage of germination.

In general, however, few reputable seedsmen have any difficulty in satisfactorily meeting their obligations under the Act.

Farmers and the Act.—During the season under review the number of visits paid by inspectors to farmers was rather lower than usual. There is no doubt that the cumulative effect of the measures taken to make the advantages and obligations of the Seeds Act known to farmers,

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together with the additional incentive given by the Wheat Act to the use of high quality wheat seed, has led them to pay more attention than formerly to the proper testing of the seeds they purchase. A number of samples were drawn by inspectors, with the permission of the farmers concerned, from parcels of seed as delivered on the farm, and, apart from the occasional absence of the full particulars required and also incorrect or unsatisfactory declarations in respect of a number of seeds mixtures, there was no serious fault to be found as regards compliance with the provisions of the Act.

On the other hand, it is still necessary to draw attention to the fact that the Act applies to the sale of seeds (including cereal seeds) from farmer to farmer, as well as from seedsmen to farmer.

Sellers of Seed Potatoes.—A good deal of attention is given by inspectors to the task of securing the enforcement of the Act in respect of the sale of seed potatoes. The task is one of some difficulty because of the seasonal character of the trade and the number of traders who deal in seed potatoes spasmodically. The result is that a number of seed potato sellers have only a vague idea of the legal requirements, and what little knowledge is possessed at one season may be forgotten by the next. It is a common occurrence to find an incomplete declaration made on sale. In order to supplement the advisory work undertaken by its inspectors the Ministry issues free of charge a leaflet (C. & S. 66A) that deals specifically with the regulations governing the sale of seed potatoes.

It may be added that inspectors' reports indicate that where seed potatoes are sold by auction there is fairly general compliance by auctioneers with the obligations of the Act.

Private Licensed Seed Testing Stations.—There has been no change in the number of private licensed stations during the year, the total remaining at 78. Although one station has surrendered its licence this has been offset by the addition of one new station.

The Ministry has always attached great importance to the oversight of these stations, which are specially licensed to conduct tests for the purpose of making the statutory declaration in respect of the licensee's own purchases and sales. Large quantities of seeds are disposed of by the

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firms who own these licensed stations, and it is therefore essential that a high standard of efficiency should be maintained by them in the technique of seed testing. Periodical visits were paid to the stations by the Ministry's inspectors throughout the year. After examination of the station's records, "Reserved Portions" (duplicate samples of seeds tested by the station) were selected for check-testing at the Official Seed Testing Station, Cambridge. It is gratifying to be able to report that the check-testing of Reserved Portions gave even better results than last year. The gross percentage of discrepancies between the Private Station and Official Station results was only just over 6 per cent. of the total number of samples so tested. This is the lowest percentage of discrepancies since the Seeds Act has been in operation, and, even so allowance should be made for discrepancies that were due to a change in the condition of the seed between the dates of testing and check-testing.

It must undoubtedly be borne in mind that the season under review followed an unusually fine harvest, and that the condition of the seeds was in most instances exceptionally good, but there is every reason for asserting that the efficiency of the stations has never been higher than at present. One or two stations still need special attention, and certain classes of seed appear to give more trouble at some stations than at others, but the number of competent analysts is steadily increasing.

In this connexion the Official Station has rendered valuable assistance by holding occasional courses of training for seed analysts. One such course was held at Cambridge during the past summer, and the examination that followed resulted in 12 out of the 20 candidates satisfying the examiners in both theory and practice, 7 being successful in practical work only, and one failing altogether.

During the year two batches of "Referee Samples," drawn from the same bulk of seeds, were sent to each of the private stations, and the results of their tests were tabulated for comparison with the Official Station's figures. These also confirmed the generally satisfactory standard of efficiency attained by the stations.

Control Sampling.—The number of samples taken during the season for the purpose of checking the particulars declared on the sale of seeds was 1,312. They comprised 456 grasses and clovers, 86 cereals, 123 field

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seeds (other than sugar beet), 327 " loose " garden seeds, 253 packeted seeds, and 67 sugar beet and seed potatoes.

Vegetable Seeds (Other than Packeted Seeds).—It was found necessary with these seeds to draw attention to 49 instances of discrepancies in the particulars declared, and to 31 incomplete or faulty declarations. Of the 49 discrepancies, 18 were in respect of purity and 31 of germination. Stated as percentages, the figures show that 7.5 per cent. called for special attention—1.7 per cent. in regard to purity, 2.9 per cent. owing to germination discrepancies, and the remaining 2.9 per cent. because of an omission from or error in the declaration.

As in previous years, the main trouble in respect of discrepancies was with grass and clover seeds that have a tendency under some conditions to lose vitality rather rapidly, with the result that a second test made at a later date may show a considerable variation in the germination percentage. As regards the purity discrepancies, 5 came within 3 per cent. of the declared figure, 10 showed a variation of between 3 and 5 per cent., and 3 exceeded 5 per cent.. With regard to the germination discrepancies, 14 were of less than 10 per cent. and 7 others were of less than 15 per cent., leaving 10 in which the difference between the germination declared and that found in the check tests amounted to more than 15 per cent.

Packeted Seeds.—Of the 253 samples of packeted seeds taken during the season, 11 (4.3 per cent.) disclosed germination discrepancies, and in 3 (1.2 per cent.) discrepancies in purity were found. In addition, it was necessary to draw attention to 13 (5.1 per cent.) incomplete declarations.

Seed Potatoes.—Three instances of misdescription of variety were investigated (1 of which concerned a Scottish seller and was accordingly referred to the Department of Agriculture for Scotland), and 3 instances of false particulars of size and dressing (of which 2 were in regard to Scottish sellers). There were 12 further cases that concerned the delivery of the statutory statements in that it had either not been supplied to the purchaser or was incomplete in respect of one or more items.

Inquiries were also made in a number of instances regarding complaints that proved to be groundless. Warnings were also sent to various vendors as a result of more

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or less minor infringements that were reported by inspectors and did not call for any further inquiry.

Prosecutions.—The number of prosecutions instituted by the Ministry during the year was somewhat larger than for some years past. Seven cases were taken and a conviction was secured in each instance. Three cases related to seed potatoes, 2 to cereal seed, and 2 to clover seed.

As regards seed potatoes, the first case concerned a Kent merchant who, after having been previously warned, continued to ignore the requirements of the Seeds Act and Wart Disease of Potatoes Order, 1923, as to the delivery of particulars on sale. The defendant pleaded "Guilty" and was fined £1 and costs. The second case related to a Bedfordshire merchant who had failed both to display and to deliver the statutory particulars. He also pleaded "Guilty" and was fined £1. The third offence was a similar one, committed by a Worcestershire merchant who pleaded "Not Guilty" but was fined 10s. and costs.

As regards the cereal seed, both cases related to sales (wheat in one instance and barley in the other) where the seller failed to deliver to the customer the required statement in respect of the germination of the seed which had not, in fact, been tested in accordance with the requirements of the Act. The first case related to an important Nottinghamshire firm, who pleaded "Guilty" and was fined 10s. and costs, while in the second case an Essex seedsman pleaded "Not Guilty" but was fined 5s. and costs.

With regard to the clover seed, the first offence involved a charge against a Yorkshire firm for having furnished a declaration that was not based on the results of a test made in accordance with the provisions of the Act. The defendants pleaded "Guilty" and were fined £2. The other case concerned a seedsman in Caernarvonshire who exposed for sale a quantity of yearling seed that had not been tested during the current season and was unaccompanied by the necessary statement as to purity, germination, etc., as required by the Act. He pleaded "Guilty" and was fined £1.

Seed Analysts' Bulletin.—Two numbers of this Bulletin were issued by the Ministry during the season, viz., No. 25 in December, 1934, and No. 26 in June, 1935.

As usual the Bulletins contained the full results of the two sets of "Referee Samples" issued to the Licensed Stations during the season. Particulars of the 7th International Seed Testing Congress held at

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Stockholm in July, 1934, were also included, together with information concerning the other activities of the International Seed Testing Association during the past year, and the amendments made to the International Seed Testing Rules.

Other contributions included a note on the Imperial Economic Committee's Report on Grassland Seeds, and articles on Seed Certification in New Zealand, Eaten or Hollow Seeds in Canadian Red Clover, the Wild White Clover Certification Scheme, the Effect of High Moisture and Warmth on Seeds, etc.; also notes on importation restrictions imposed by countries abroad.

Publications.—Copies of the Seeds Act, 1920 (price 3*d.* net); the Seeds (Amendment) Act, 1925 (price 1*d.* net); and the Seeds Regulations, 1922 (price 3*d.* net) are obtainable from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C.2, or through any bookseller.

A convenient summary of the provisions of the Act and Regulations showing in addition the fees for testing at the Official Station and the size of seed samples to be sent, and also a memorandum on the drawing of samples for testing, may be obtained free of charge on application to the Ministry at 10, Whitehall Place, London, S.W.1.

MARKETING NOTES

Milk Marketing Scheme: Pool Prices for October, 1935.—The wholesale contract price for October, 1935, was 1s. 5d. per gallon in all regions. Pool prices and rates of producer-retailers' contributions are given below, with comparative figures for September, 1935, and October, 1934, when the wholesale price was 1s. 4d. in all regions:—

Region	Pool Prices (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	Oct. 1935	Sept. 1935	Oct. 1934	Oct. 1935	Sept. 1935	Oct. 1934
Northern ..		12½	13½	3½	2½	1½
North-Western ..		12½	13½	3½	2½	2½
Eastern ..		13	14½	2½	2½	1½
East Midland ..		13	14	3½	2½	1½
West Midland ..		12½	12½	3½	3½	2½
North Wales ..		12½	12½	3½	3½	2½
South Wales ..		12½	13½	3½	2½	1½
Southern ..		13	14½	2½	2½	1½
Mid-Western ..		12½	13	3½	3½	2½
Far-Western ..		12½	12½	3½	3½	3
South-Eastern ..		13½	14½	2½	2½	1½
Unweighted Average		12.73	13.55	3.18	2.89	2.03

These prices are exclusive of the premiums for special services and for level deliveries, and also of the accredited producers' premium.

The inter-regional compensation levy was 2d., compared with 1½d. and ¾d. in September, 1935, and October, 1934, respectively. A levy of ¼d. per gal. was made for general expenses.

Sales on wholesale contracts were as follows:—

	October, 1935. (estimated) gal.	October, 1934. gal.
Liquid	47,267,205	46,770,323
Manufacturing	21,290,207	16,699,955
	68,557,412	63,470,278
Percentage Liquid Sales	68.95	73.69
Percentage Manufacturing Sales	31.05	26.31

The average realization price of manufacturing milk during October was 6.22d. per gal., compared with 5.54d. per gal. for October, 1934. The quantity of milk manufactured into cheese on farms was 1,400,136 gal., compared with 1,199,866 gal. in October, 1934.

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Pigs and Bacon Marketing Schemes: Pig Prices for November.—The price of the basic pig (i.e., Class I, Grade C) was 11s. 4d. per score in November compared with 10s. 2d. in October. The improvement in price was due to the increase in the ascertained bacon price from 82s. 2d. to 90s. 3d. per cwt. There was no change in the cost of the feeding stuffs ration.

Bonus Scheme.—Those registered producers who qualified for bonus under the 1935 contract have now received interim payments in respect of pigs delivered by them in accordance with the Bonus Scheme in the period January-April, 1935. These payments were at the rate of 6d., 4d., and 2d. per score, according to the class of bonus for which the producer qualified. A further and final payment will be made in the New Year, when all the contributions have been received from registered curers on pigs delivered in 1935.

The bonus scheme for 1936 continues the principle of paying bonus on pigs delivered in the first four months of the year, and an additional bonus will be payable as an inducement to producers to deliver pigs during those months at a uniform rate. The bonus fund is again contributed by the curers at the rate of 2d. per score as before.

Potato Marketing Scheme.—At the second annual general meeting of registered producers held under the Potato Marketing Scheme the two retiring Special Members, Mr. R. W. Halliday and Sir W. G. Lobjoit, O.B.E., J.P., were re-elected.

Census of Stocks.—The Board have requested registered producers in England and Wales to state the estimated tonnage on their farms, as at November 9, of ware potatoes of marketable quality capable of being dressed over a 1½-in. riddle, and also the tonnage of potatoes of the 1935 crop which had been sent away from their farms up to that date.

Riddle Regulations.—To meet cases of difficulty caused by the operation of the minimum riddle of 1½ in., the Board decided, on November 1, to grant permits to individual producers in special cases to sell potatoes dressed over a 1½ in. riddle. At a subsequent meeting, on November 28, the Board withdrew these arrangements, and decided that the minimum riddle should be reduced from 1½ in. to 1½ in. for all varieties.

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Hops Marketing Scheme.—The Hops Marketing Board have received 149,065 pockets of 1935 crop hops, the total weight of which is estimated at 227,000 cwt. This is 2,000 cwt. in excess of the estimated market demand for hops of this season.

Committees of Investigation.—The Committees of Investigation for England and for Great Britain have suffered a heavy loss by the death of their Chairman, the Rt. Hon. Edward Shortt, K.C. Mr. Shortt had acted as Chairman since the Committees were constituted.

Regulation of Meat Imports, July-September, 1935.—The arrangements made for the regulation of imports of meat during the last six months of 1935 were detailed in the September number of this JOURNAL (pp. 583-585). The following statements show (a), for Empire countries, imports of meat in the third quarter of 1935 compared with imports in the corresponding quarter of 1934 and with allocations for the six months, July-December, 1935, and (b), for foreign countries, imports in the third quarter of 1935 compared with allocations for that quarter and with imports in the corresponding quarter of 1934:—

(a) EMPIRE COUNTRIES.

	(000 cwt.)		
	<i>Allocations.</i>	<i>Imports.</i>	
	<i>July-December,</i> 1935.	<i>July-Sept.</i> 1934.	<i>July-Sept.</i> 1935.
Chilled and Frozen Beef and Veal	1,876.4	1,003.9	1,196.0
Frozen Mutton and Lamb ..	2,528.2	1,427.8	1,226.8
Frozen Pork	345.8*	109.7	170.8

(b) FOREIGN COUNTRIES.

	(000 cwt.)		
	<i>Allocations.</i>	<i>Imports.</i>	
	<i>July-Sept.</i> 1935.	<i>July-Sept.</i> 1934.	<i>July-Sept.</i> 1935.
Chilled Beef	1,988.0	1,967.0	1,980.7
Frozen Beef (Carcass and Boned Beef) and Veal ..	49.5	43.6	52.9
Frozen Mutton and Lamb ..	263.1	262.0	252.3
Frozen Pork	95.6	164.5	72.9

It will be seen that supplies of beef and veal, and mutton and lamb from foreign sources in the third quarter of 1935 conformed closely to allocations, which represented 87½ per cent. of the quantity imported in the corresponding quarter

* Includes one-half of the allocations of baconers to Australia and New Zealand for the year 1935.

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of the Ottawa year (July, 1931-June, 1932) in the case of chilled beef, and 65 per cent. in the case of frozen beef (carcass and boned beef) and veal, and of frozen mutton and lamb. Owing to short supplies from the United States of America, imports of frozen pork were 22,700 cwt. or 24 per cent. short of the allocation, which represented the average of imports in the corresponding quarter of the three years 1932, 1933 and 1934.

As regards Empire countries, imports of beef and veal during the third quarter of 1935 represented nearly 64 per cent. of allocations for the six months, July-December. This reflects the seasonality of supplies from the two principal Empire sources, viz., Australia and New Zealand, arrivals from which in the fourth quarter are expected to be considerably lower than in the third quarter and some 100,000 cwt. less than the quantity that arrived in the fourth quarter of 1934.

Regulation of Imports of Processed Milks.—The arrangements for the regulation of imports of processed milks from foreign countries and the Irish Free State from April 1, 1935, were described in the June, 1935, issue of this JOURNAL (pp. 272-3). Proposals have now been put before exporting countries for the extension to the end of the year of the arrangements in force during the third quarter for imports of condensed milk and milk powder, pending the receipt and consideration by H.M. Government of any recommendations which the Import Duties Advisory Committee may make in consequence of the application at present before them for an increase in the duties on imports of these products.

Source			Condensed Skimmed Milk	Condensed Whole Milk	Milk Powder	Cream
			cwt.	cwt.	cwt.	cwt.
Foreign countries	{ Allocations ...		310,620	81,340	30,470	11,180
	{ Imports ...		325,790	56,620	16,860	13,360
Irish Free State	{ Allocations ...		25,470	2,250	*	16,490
	{ Imports ...		20,320	3,490	210	12,320
Other Empire Countries	{ Imports, 1933		160	34,310	63,460	—
	{ Imports, 1934		—	54,560	18,330	—
	{ Imports, 1935		—	39,090	22,030	—

* Imports of Milk Powder from the Irish Free State are not at present subject to regulation.

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Imports of processed milks during the July-September quarter, together with the allocations made to foreign exporting countries and the Irish Free State, and as regards other Empire countries imports in the corresponding quarter of the two previous years are shown in the table (page 930).

Milk Act, 1934: *Section 1.*—Under this Section advances made up to November 15 to the Milk Marketing Board for England and Wales in respect of milk used for manufacture (excluding milk manufactured by the Board itself, or milk used for cheese-making on farms) amount to £1,450,034. Particulars, which are subject to minor adjustments, are given below:—

Period	Gallons	*Rate of advance per gallon	Advances
April to Sept. 1934	79,393,713	Varying from 0.5 to 1.5 pence	£ 426,603
Oct., 1934 to March 1935	73,549,510	Varying from 1.0 to 2.28 pence	571,433
April to Sept. 1935	120,226,416	Varying from 0.5 to 1.21 pence	451,998
Total	273,169,639	-	1,450,034

* Varies according to month and product.

Section 3.—Advances made up to November 15 to the Milk Marketing Board under this Section in respect of milk used in the manufacture of cheese on farms amount to £120,236. Particulars, which are subject to minor adjustments, are as follows:—

Period	Gallons	*Rate of advance per gallon	Advances
April to Sept. 1934	16,045,009	Varying from 1.14 to 1.60 pence	£ 92,720
Oct. 1934 to March 1935	2,321,667	Varying from 1.75 to 2.28 pence	19,950
April to June 1935	2,286,876	Varying from 0.74 to 0.96 pence	7,566
Total	20,653,552	-	120,236

* Varies according to month.

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Section 6.—The total sum paid under this Section by direction of the Treasury to the Government of Northern Ireland with the object of securing a standard price for milk manufactured into cream and butter at registered premises in Northern Ireland amounts to £250,492. Particulars are set out below:—

Period	Gallons	*Rate of Payment per gallon	Amount of Equalization Payment
April to Sept. 1934	12,150,317	Varying from 1'3 to 2'2 pence	£ 101,353
Oct. 1934 to March 1935	6,049,718	Varying from 1'88 to 2'99 pence	62,077
April to August 1935	12,622,974	Varying from 1'30 to 1'89 pence	87,062
Total	30,823,009	—	250,492

* Varies according to month.

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4·85 pence per lb. for the month of November, 1935.

Milk-in-Schools Scheme.— Payments amounting to £379,452 have been made up to November 15 to the Milk Marketing Board under Section 11 of the Milk Act by way of compensation in respect of the Board's expenses in supplying 20,639,932 gallons of milk to school children at reduced rates.

The Cattle Fund.— Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by November 15 to £4,374,690. These payments were in respect of 1,841,335 animals, the average payment per beast being £2 7s. 6d. Some 528,000 imported animals have been marked at ports (excluding Northern Ireland) since August 6, 1934, under the Marking of Imported Cattle Order.

Wheat Act, 1932 : Sales of Home-grown Wheat, Cereal Year 1935-36.—Certificates lodged with the Wheat Commission by registered growers during the period August 1 to November 15, 1935, cover sales of 12,749,131

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cwt. of millable wheat as compared with 12,509,613 cwt. in the corresponding period (to November 16) in the last cereal year.

Deficiency Payments.—The Wheat Commission have announced that the first advance payment in respect of the cereal year 1935-36 will be made to registered growers who deliver proper applications on valid wheat certificates to the Commission on or before November 1. Payment will be made on or about November 30 and will be at the rate of 2s. 9d. per cwt. (12s. 4½d. per quarter of 504 lb.). No further payment will be made on these certificates until September, 1936, when any balance due will be paid. The Commission hope to make three further advance payments during the current cereal year at dates to be announced in due course.

New Quota Payments Order.—The Minister, in pursuance of the powers conferred upon him by the Wheat Act, 1932, and on the recommendation of the Wheat Commission, has made the Wheat (Quota Payments) No. 3 Order, 1935 (Statutory Rules and Orders, 1935, No. 1062) prescribing that the amount of the quota payment which every miller and every importer of flour shall be liable to make to the Wheat Commission in respect of each hundredweight of his output, shall, as from November 3, 1935, be reduced to 16·8 pence, i.e., 3s. 6d. per sack of 280 lb. This Order supersedes the Wheat (Quota Payments) No. 2 Order, 1935, under which the quota payment has been 19·2 pence per cwt., i.e., 4s. per sack of 280 lb., since September 29, 1935.

Amendment of Wheat By-laws 1932.—The Minister and the Secretaries of State for Scotland and the Home Department have made the Wheat Commission (Approval of By-laws) No. 9 Order, 1935. This Order approves the addition of the proprietary mixture known as "Maltix" to those named in By-law 19 of which the non-flour content shall be deemed not to form part of the flour.

Sugar Beet: Production of Home-grown Beet Sugar, 1935-36 Campaign. Returns made by the beet sugar factories operating in Great Britain show that the total quantities of beet sugar manufactured during October, 1935, and the corresponding month in 1934 were:—

				<i>White. cwt.</i>	<i>Raw. cwt.</i>	<i>Total. cwt.</i>
1935	..	..	..	1,236,244	1,616,723	2,852,967
1934	..	..	..	1,378,685	1,708,392	3,087,077

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The total quantities of sugar produced to the end of October in each of the two manufacturing campaigns were:—

		<i>White. cwt.</i>	<i>Raw. cwt.</i>	<i>Total. cwt.</i>
Campaign	1935-36 ..	1,315,712	1,666,771	2,982,483
	„ 1934-35 ..	1,560,332	2,073,594	3,633,926

Present indications are that the crop will be about 10 per cent. below the record crop of last year.

Home Grown Sugar Ltd.—The Minister has appointed Sir Louis Kershaw, K.C.S.I., C.I.E., as Financial Representative of the Government on the Board of the above Company in place of the late Sir James Martin.

National Mark Scheme for Cream Cheese.—The Agricultural Produce (Grading and Marking) (Cream Cheese) Regulations, 1935, prescribing statutory grade designations and definitions of quality for cream cheese, have been published in draft form.

Provision is made in the regulations for two grades, viz., “Extra Selected (Double Cream)” and “Selected.” Cheese to which either of these designations is applied is required to be clean and rich in flavour and without taint or rancidity. Its texture must be close, smooth and uniform, and the body soft, creamy and even. The shape of the cheese must be regular with a complete absence of rind, and the colour a uniform cream throughout. Cream cheese of the “Extra Selected (Double Cream)” grade is required to contain a minimum of 70 per cent. by weight of butter fat, the minimum for the “Selected” grade being 55 per cent.

It is proposed that manufacturers whose total annual output of cream cheese is not less than 5 cwt. shall be eligible for authorization in a National Mark cream cheese scheme, provided they are able to satisfy the Ministry’s requirements as to the suitability of their premises, equipment and methods. The responsibility for grading the cheese and applying the National Mark will rest with the authorized makers. The outer wrapper of each cheese will bear the mark and the name or registered number of the packer, and the date (in code) on which the cheese was made.

Full particulars of the scheme may be obtained on application to the Ministry.

National Mark Dressed Poultry.—On the recommendation of the National Mark Egg and Poultry Trade Com-

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mittee the statutory grades for dressed poultry have been revised. The new Regulations, which came into effect at the end of November, not only prescribe revised definitions for the present "Select" grades of poultry, but also include "Prime" grades for each class of poultry. The "Prime" grades are applicable to well-fleshed poultry that are good quality but are not of a sufficiently high standard to be graded "Select." Copies of the Regulations may be obtained directly from H.M. Stationery Office or through any bookseller, price 2*d.* net.

A particularly good show of table poultry was to be seen this year at the Dairy Show, and the general quality was better than in 1934. The two classes for market packs for 6 birds shaped for market but not drawn, and complying with the statutory grade definitions, attracted respectively 27 and 37 entries. The awards in these classes were as follows:—

Class 18 (6 cockerels, net weight not to exceed 33 lb.)

1st and Silver Medal	..	Cotswold Table Poultry Co. (National Mark Packer).
2nd and Bronze Medal	..	R. C. Morgan.
3rd	..	Alexander and Angell (National Mark Packer).
Reserve	..	Goatacre Poultry Farm, Ltd. (National Mark Packer).
Very Highly Commended		Alexander and Angell (National Mark Packer).

Class 19 (6 cockerels or 6 pullets, net weight not to exceed 24 lb.)

1st and Silver Medal	..	Cotswold Table Poultry Co. (National Mark Packer).
2nd and Bronze Medal		Mrs. G. Meinertzhagen.
3rd	..	O. A. Batten (National Mark Packer).
Reserve	..	Goatacre Poultry Farm, Ltd. (National Mark Packer).

National Mark Wheat Flour Scheme.—The Supplies Committee of the London County Council has decided that the Council's specifications for supplies of flour for bread-making shall provide for 25 per cent. National Mark All-English Yeoman Straights and 75 per cent. All-Empire flour. The Committee has also decided that the Council shall use exclusively National Mark All-English Yeoman Straights for kitchen purposes.

National Mark Wheat Flour for Bread-Making Control Tests.—The National Bakery School has conducted bread-making tests with 14 samples of National Mark All-English (Yeoman) Straights, milled from 1935 crop wheat.

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The flour was supplied by millers from different parts of the country, and in every instance satisfactory bread was produced. The following are the main observations taken from the Director's report:—

(1) This year all the flours possessed a good colour, which was reflected in the bread by a greater uniformity of good creamish colour, and the absence of extremely yellowish crumbs, which are not so well favoured.

(2) All the flours produced doughs that gassed well and possessed a good fermentation tolerance and stability. There was a tendency to run after moulding.

(3) Following the practice of previous years, a short process of $2\frac{1}{2}$ hours in the dough was employed, thus giving a total length of process of approximately $4\frac{1}{2}$ hours from start to finish.

(4) On the whole, the flours did not possess the same ability to carry the water absorption of the past few years, and in a few cases $14\frac{1}{2}$ gallons was the maximum. In other cases 15 and $15\frac{1}{2}$ gallons were carried quite satisfactorily.

(5) All the samples, with one exception, produced bread that possessed good volume and bloom. They all possessed a good crumb colour, far better on the whole than in any previous year.

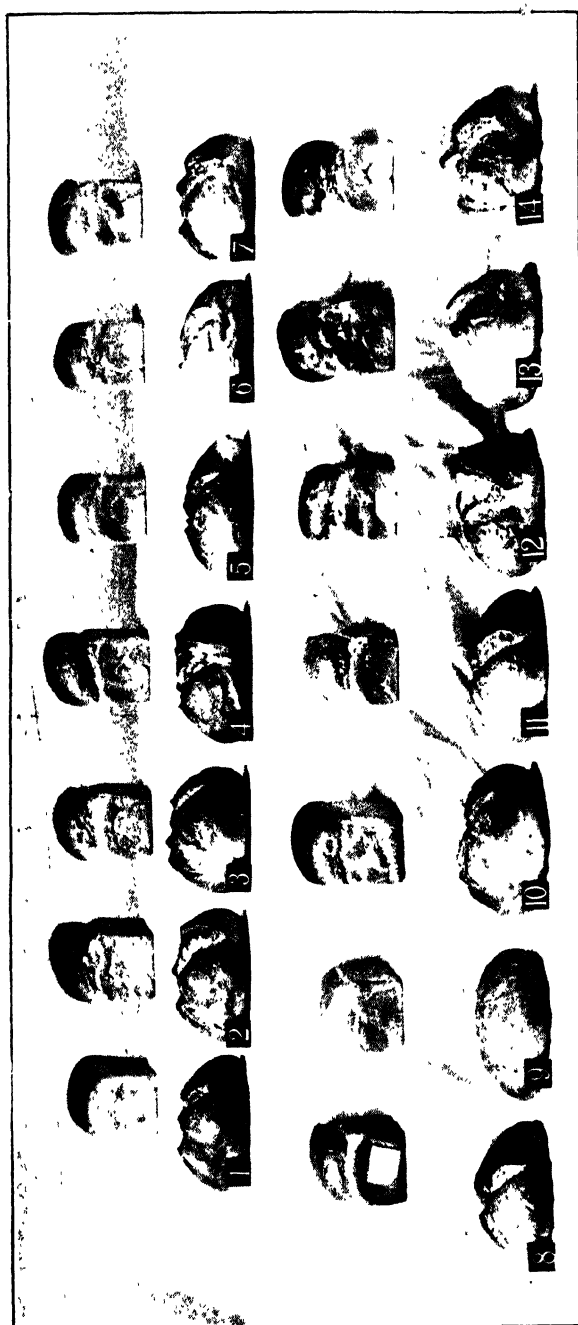
(6) The crusty bread on the whole was good, the bread springing in a regular manner in the oven, whilst several of the tin loaves possessed an even spring equal to that obtained from home-milled flours containing a good proportion of Manitoba wheat.

(7) Flour of the quality such as has been obtained this year can be used for many purposes in the bakery. It is suitable for blending with stronger flours and for use in confectionery for shortbread, pastry and cakes.

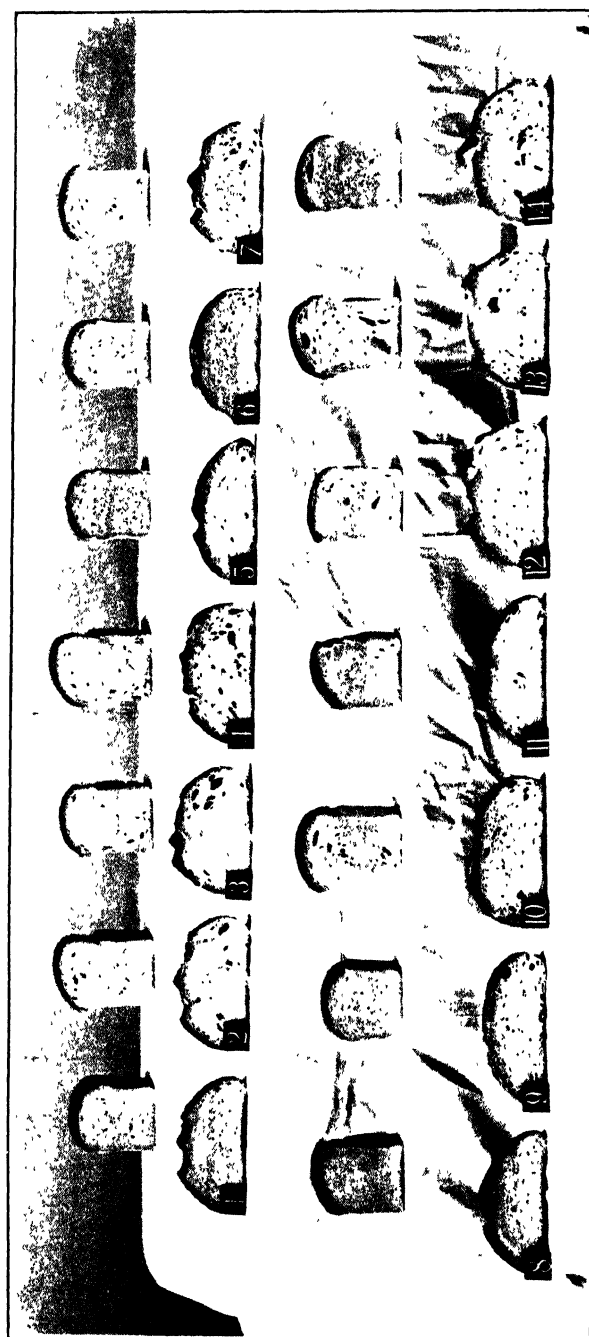
Whilst there were no flours of outstanding quality as far as water absorption and strength were concerned, the majority were capable of producing good tin and crusty bread. All the flours produced excellent cottage bread, but this was of a type different from the normal commercial loaf as made by the majority of bakers. Photographs of the test loaves are shown on the accompanying inset.

Copies of Marketing Leaflet No. 12e, giving the recipe for using National Mark flour in commercial bread-making, may be obtained from the Ministry, free of charge on request.

The National Tomato Box.—The Ministry has from time to time received reports of home-grown tomatoes arriving on the wholesale markets in a soft and flabby condition during periods of hot weather. So serious was this matter that the National Mark Fruit Trade Committee decided to appoint a Sub-Committee to investigate the causes of the deterioration of tomatoes in transit. The Sub-Committee arrived at the conclusion that the trouble was due in some measure to inadequate ventilation. During the 1935 tomato season experiments have been carried out with



Bread-making tests, copied out at the National Bakery School with samples of National Bread. All English. (Opposite) Strangers, milled from the 1945 crop wheat. Test 100 is most



Bread-making tray. Rows of dough cut out of a lump of B.K. or 700 g. each, supplied by Nahrung I. Markt. All-English.
 Yeast and sugar are added to the dough about 1.5 g. leaves each.

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a number of different types of box, and, as a result of these experiments, a specification has been drawn up for a modified and improved box, which the Fruit Trade Committee recommended shall be called "The National Tomato Box." The use of this box will be recommended to all authorized packers in the National Mark Scheme for use during the 1936 season, in addition to the Standard box now in general use. It is hoped that as many growers as possible, whether authorized packers under the National Mark Scheme or not, will make use of the National box.

Specifications (The internal dimensions of the box approximate to those of the present Standard box).

End Boards—9 in. $\times$ 5 $\frac{1}{2}$ in $\times$ $\frac{3}{8}$ in.

Side Boards—14 $\frac{3}{4}$ in. $\times$ 5 in. $\times$ $\frac{3}{16}$ in.

These boards are nailed on to the end boards so as to leave $\frac{1}{4}$ in. free space at top and bottom of the box.

Bottom—2 boards—14 $\frac{3}{4}$ in. $\times$ 4 $\frac{7}{16}$ in. $\times$ $\frac{3}{16}$ in. each.

These boards are nailed on to the ends of the box in such a position that their outer edges are flush with the outer edges of the side boards.

Lid—3 boards—14 $\frac{3}{4}$ in. $\times$ 2 $\frac{3}{8}$ in. $\times$ $\frac{3}{16}$ in. each.

These boards, with a free space of $\frac{3}{4}$ in. between each pair, are nailed on to the end boards. The outer edges of the two outer boards must be flush with the outer edges of the side boards.

A batten—9 $\frac{3}{8}$ in. $\times$ 1 in. $\times$ $\frac{5}{16}$ in. is nailed on at each end of the lid.

A batten—8 in. $\times$ 1 in. $\times$ $\frac{3}{8}$ in. is nailed on to each of the end boards just below the lid, so as to keep the boxes apart in transit.

It will be found that this end batten facilitates the handling of the box.

It will be seen that the design of the National Tomato Box provides a free space both at the top and bottom of the box, and thus allows a steady current of air to pass through the contents of the box when the tomatoes are in transit. The battens are designed to keep the boxes apart and to allow the extra ventilation provided to have effect.

In order to ensure that the contents of the box are fully ventilated, however, the Fruit Trade Committee has recommended that perforated liners should be used with the National Tomato Box. The Sub-Committee that designed the box is experimenting with a number of different designs of perforated lining papers, and growers will be informed of the type of lining paper recommended in good time before the opening of the next tomato season.

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Copies of the specification of the National Tomato Box have been sent to box manufacturers.

A new National Mark label suitable for use with the box will be printed and supplies will be obtainable next season on application to the Secretary, Ministry of Agriculture and Fisheries, London, S.W.1.

Marketing Demonstrations.—The following displays have been arranged for December:—

<i>Exhibition or Show.</i>	<i>Location.</i>	<i>Date, 1935.</i>	<i>Nature of Exhibit.</i>
Birmingham Fat Stock Show	Birmingham	Nov. 30— Dec. 5.	Demonstration of meat marketing schemes.
Smithfield Fat Stock Show	Agricultural Hall, Islington	Dec. 9-13.	Ditto. (Live Animals.)
Manchester Xmas Fat Stock Show	Manchester	Dec. 14-17.	Demonstration of meat marketing schemes.
Ashford Fat Stock Show	Ashford, Kent	Dec. 16-17.	National Mark Pro- duce: Egg grading demonstration.

A display of turkeys will be included at the Birmingham and Manchester Shows.

Lord Mayor's Show.—Agriculture occupied a prominent place in the Lord Mayor's Show on November 9, when a large part of the procession consisted of a pageant of agriculture and country life. No fewer than twenty cars in this pageant were devoted to various representations of agricultural production. A tableau, arranged by the Ministry, showing John Bull and his family partaking of a meal of English National Mark produce, attracted considerable attention, as also did the walking representations of National Mark commodities that followed the tableau (see accompanying illustrations).

France: New Measures for the Regulation of the Wheat Market.*

—Important changes in the regulation of wheat production and marketing in France were introduced by the recent decrees which provide, amongst other things, for the suppression of the tax on production as from January 1 next (this tax has been yielding over £2 million per annum since its introduction in 1933), for the limitation of the working capacity of existing mills and the amount of flour which each may sell, and for the general regulation of the wheat market by fixing import requirements during deficit years and the quantities to be absorbed from the market in surplus years.

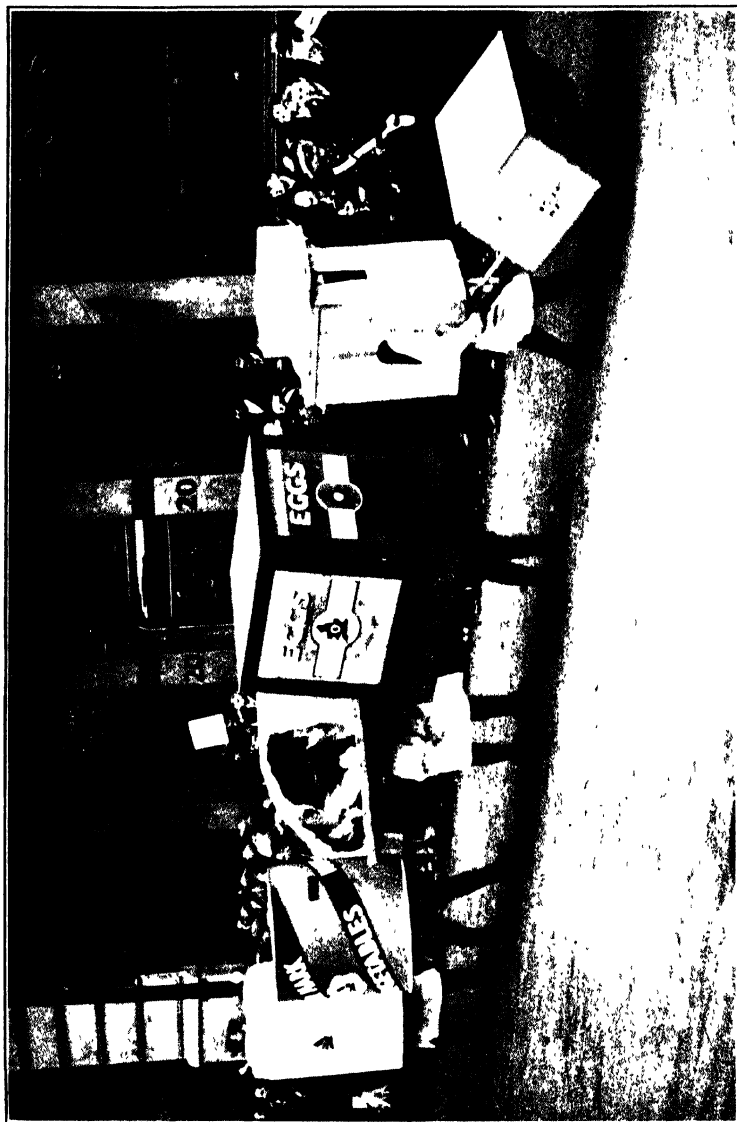
The new regulations with regard to the method of estimating the crop and of determining the surplus or deficit quantities, which are of special interest, are as follows:—

Each year between August 15 and 31 in each Department (i.e., administrative area), a commission presided over by the Prefect and comprising the Director of Agricultural Services, President, Vice-

* Note by the Market Supply Committee.



Photo Sport and General Press Agency


$$P_{\text{hot}}, \quad \text{Seventy}^{\circ}\text{C} \times (N_{\text{wet}}/P_{\text{r}}) \times \log_{10} 2$$

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President and Secretary of the Chamber of Agriculture, four wheat producers nominated by the Prefect from a list submitted by the Chamber of Agriculture, a representative of the grain trade, a miller and a thresher, will proceed to compile an estimate of the crop. These district statistics will then be transmitted to the Ministry of Agriculture before September 5 and submitted to a meeting of the Presidents of the Chambers of Agriculture as well as to an expert Cereal Committee, made up of an equal number of producers' representatives on the one hand, and of grain merchants and millers on the other.

On the proposals of these two organizations, a decree issued before October 1 will fix, in a deficit year, the quantity of wheat to be imported and in a surplus year, the quantity to be eliminated from the internal market in the form of wheat or flour for export, for denaturation or for the constitution of reserve stock. The necessary executive measures to this end will be carried out at the mills. The millers will be required to prove that they have carried out their obligations under penalty of suspension of their activities. The export of wheat or flour, when necessary, will be carried out by the Cereal Committee referred to above, which will be provided with resources for this purpose.

Belgium : Propaganda for the Increased Consumption of Food-stuffs.*—In order to encourage the consumption of agricultural produce, a resolution was recently passed at the National Commission for Internal Commerce, in favour of the creation at the Ministry of Agriculture of an Office of Information and Propaganda with regard to Agricultural Produce. The proposed Office will be required to study the internal market as regards consumption needs, particularly by the collection of statistics, which will be furnished as rapidly as possible to the interested organizations. The Office will also study the methods adopted in foreign countries for tackling problems similar to those existing in Belgium. The closest contact is to be maintained between the Office and producers' organizations, particularly as to propaganda. The Office is also to keep in touch with consumers.

* Note by the Market Supply Committee.

DECEMBER ON THE FARM

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IN many ways December and January may be classed agriculturally as the "dead months" of the year. Harvesting has been completed, growth is at its very minimum, and tradition in most districts predicts disappointment for those who sow at this time. There thus appears every excuse for a relaxing of effort, and yet it is probably not too much to say that a farmer might be judged very well by the use which he makes of these months. Almost anyone can feel the urge to exertion of mind and body at seed time, and during the throng of summer work, yet it may truly be said that smooth working in the busy seasons of the year depends very largely on the use made of the "dead" months, and they give excellent opportunities for the display of forethought, which may contribute far more to the success of the year's work than superabundant energy and dashing about when the busy times come.

The overhauling of machinery and implements so that they are ready for work at a moment's notice; the countless repairs to premises, roads, fences; the clearing of drains and ditches, which ought to be done in the summer, but somehow gets neglected; the snatching of favourable intervals—however short—for work on the land; the carting out of manure, etc.—all these things demand quite as close personal overlooking as the sowing of a root crop, or the harvesting of a hay crop. The long winter evenings also give opportunities for taking mental stock of the farm and its policy, and the laying of plans for the coming year. In these days, no one can complain of shortage of suggestions. Never before has agricultural literature, from the weekly paper to the scientific periodical, attained anything like its present volume or standard. Even for one whose business it is to be informed about latest developments, it is by no means easy to keep up with the flood of publications, and it is one of the most hopeful signs of the times that farmers, who have so many calls on their time, do obviously read a great deal.

Grass Land. —Among the operations that may be carried

out on the land this month is the cultivation of grass land. There is now a considerable choice of implements specially designed for the purpose, but one of the most effective methods is still the treading of stock, which are at the same time induced to pull off the rough herbage before it becomes completely weathered and deprived of food value. In our winter reading it is useful occasionally to turn up some of the old writers, if only to acquire a more humble frame of mind. Thus Thomas Tusser, writing in the 16th century, notes on December Husbandry:—

“ In meadow or pasture to grow the more fine
Let campers be camping in any of thine.”

As camping was a form of football, it is clear that the effects of mechanical treatment of rough grass land were even then well appreciated.

Cattle Yards. —By now arable farmers will have their fattening sheds and yards fully occupied. In many districts the shortage of roots will cause some difficulty in getting the usual quantity of straw turned into manure, though the embarrassment will not be so great as in the days when it was considered essential to give a fattening bullock all the roots he could eat. There is a close connexion between the winter fattening of cattle and threshing, which is one of the many jobs that provide useful occupation when the land is wet or frozen. In the days of the flail, freshly-threshed straw was available almost daily as the work proceeded right through the winter. Now, where the travelling machine does most of the work, a considerable quantity of corn is usually threshed at a time, and necessarily much of the straw is not particularly fresh when it is fed to the cattle. Those who have watched the evident gusto with which fresh straw is received will wonder what changes take place in stored fodder. It is not likely to be revealed by ordinary analysis, but may none the less be of very considerable importance. One sometimes wonders whether the higher value often ascribed to Scottish oat straw is not largely due to the system of threshing. On the arable farm north of the border there is usually a small fixed threshing mill driven by the farm oil engine. The corn is stacked in small ricks, and an opportunity is taken of carting one of them into the loft above the mill. It can then be threshed on dark mornings or on a wet day when outdoor operations would be impossible, and the fattening cattle get straw that has never

had more than a week or two to become stale or dusty or flavourless, or whatever it is that happens during storage.

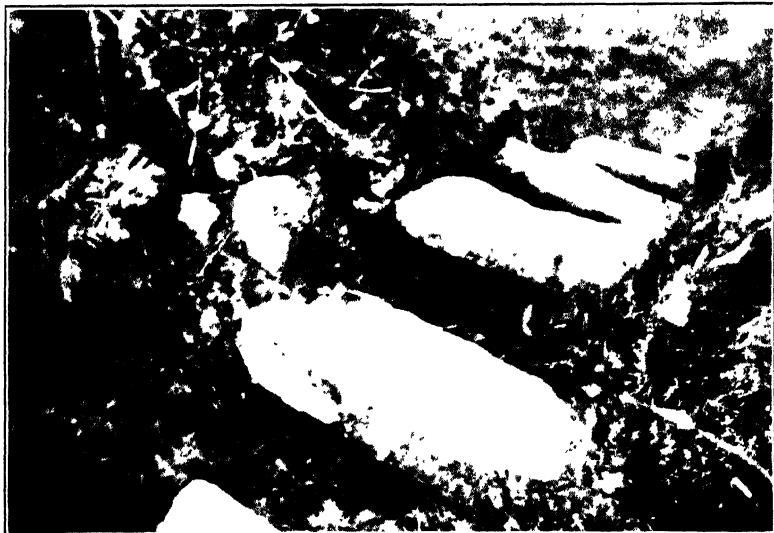
Fat Stock Shows.—The fat stock shows form one of the chief features of the month, and there is still sufficient of the traditional John Bull in most of us to enable us to glory in the monumental products of the skill of the breeder, rearer and feeder that enjoy, or at least receive, the lime-light. It would perhaps be churlish to examine too closely the present usefulness of the exhibits that come in for most attention, or to press inquiries into costs and returns. Who can value the pride and pleasure of owner and feeder, or the uplift gained by standing out above the ordinary ruck of one's fellows even once a year.

It is well, however, to keep things in proper perspective, and the really keen man will devote his most serious study to the carcass classes and the grading demonstrations that now figure in the more important shows. An undiluted assemblage of carcass classes and the like would probably not attract a sufficient gate, but one could wish that show societies would give them more space and prominence. Fat stock shows, coming at the time they do, serve also the very useful purpose of a semi-social function, and help to recall the good old spacious days when "farming was really farming." It may be predicted that it will be long before such functions completely lose their old character. Have they not their roots deeply founded in the times when December ushered in the long winter, in which salted carcasses would provide the common fare, and induced all and sundry to make the most of fresh meat!

For Young Farmers.—When one travels about the country it is useful to note the variety in material and design of the fences, and to study their advantages and weaknesses. To a great extent they reflect the nature of the geology and soils. In western areas generally it is difficult to maintain good hawthorn hedges. This may partly be due to the combination of heavy rainfall, badly-drained soils, and salt-laden winds, but the abundance of rabbits and the heavy population of mountain sheep are undoubtedly very important factors. The fondness of sheep and particularly lambs for the young buds of hawthorn soon results in the hedge being defective at the bottom. The attacks of rabbits in a hard winter are even more deadly, as the barking of



Stone wall and small enclosure near Barmouth, North Wales.
Erected where stone is plentiful and when labour was cheap.



stone stile over a Cornish stone and earth wall - impassable to cattle but
not to sheep

Photos H. C. Long

the stems quickly create actual gaps. Perhaps the most characteristic "fence" in counties on the western seaboard from Cornwall northwards is some form of stone or earthen bank. It may take different forms, and vary from what is really a stone wall to a bank wide enough to carry a cart track on the top. Dry stone walls may be seen in the Lake District, in Derbyshire, many parts of Wales, such as Cerrigydruidion, and on the Cotswolds. These walls, made of stone native to the district, impart to the countryside a beauty characteristic of the locality. It is doubtful if any blend could be found to surpass that of the Cotswolds, with the walls and buildings made from the local stone; but not all local material is beautiful. The slate fences of Caernarvonshire, for example, do not enhance the appearance of the countryside; they are made from slate palings, a by-product of the slate industry.

The dry walls were built up to about the middle of last century. Many miles of these are 6 ft. in height; and have been left untouched by the storms of years—a party of hikers or a few poachers may do more damage to these walls in ten minutes than years of bad weather. Close inspection reveals that constructing a wall out of stones of such varying sizes and shapes requires much skill. On steep or undulating ground, for instance, the tilt of the stones has to be altered to give stability; if this were not done, a breach made in the wall on a steep slope would cause the collapse of much of the wall above. In some parts, as in Carmarthenshire, the picturesque effect is enhanced because of the split boulders that have been used. This gives a mottling effect.

On many farms, the building of such walls served to provide both useful shelters and fences, and a means of disposing of the stones on the land. There are people in their sixties who remember their fathers describing how land, once useless through so many stones and boulders, was reclaimed by the construction of these walls. In discussing the dry walls on the College Farm mountain land, a colleague remarked that it was possible to pick out the lengths constructed by the different men: they seemed to have been working in lengths of 50 yards, and, whereas the work of some men requires constant repairs, that of others rarely needs attention.

Efforts are now being made to revive the art of dry wall building. In some districts, authorities responsible for road

DECEMBER ON THE FARM

construction have built walls of this type, and, to do this, have had to search for the few men still remaining who could do this work. There is no doubt that this mobilization of dry wall builders by the local authorities is doing much to keep alive the art. Again, in some counties, such as in the north-west of England, the Education Committees are organizing classes in this subject.

Walls and banks have the advantage of providing good shelter for stock; this is, indeed, their primary function, as they require to be supplemented by a wire fence on the top or sides if they are to be sheep proof. They occupy a great deal of space and harbour all kinds of weeds, but perhaps their most serious fault is that they form ideal homes for rabbits, which are now a real menace to the agriculture of large areas.

In these days, the desire to economise in labour makes the wire fence almost the only practicable form of fencing. It gives no shelter, but is undoubtedly effective as a fence. Hardly any rough stone wall is really proof against a mountain sheep. At the College Farm a mountain wall 5 or 6 ft. high has had to have a wire fence put along the top, but the same sheep can be controlled perfectly by a woven wire fence 3 ft. high. The explanation is that a sheep very rarely takes a flying jump at a fence; rather, it scrambles over, and a rough stone wall gives plenty of foothold and is ineffective unless there is a wide coping to turn sheep back.

NOTES ON MANURING

J. A. SCOTT WATSON, M.A.,
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Effects of Artificial Fertilizers on the Nutritive Value of the Plant.—From time to time the idea keeps cropping up that the use of chemical fertilizers is an “unnatural” expedient used by man to force his crops into “unnatural” growth, and thus tends to produce “unnatural” foods that may, in the long run, have harmful effects upon the animals or human beings that consume them. The suggestion is a difficult one to disprove, if only because it is usually made in a very vague and indefinite form. Thus it is useless to show that wheat grown with sulphate of ammonia and superphosphate has the same general composition as other wheat grown with dung or with the residues of the sheep fold; the difference may be one that does not show up in a chemical analysis. Again, it is useless to point out that an application of slag to a sheep pasture may lead to an obvious improvement in the health and growth-rate of the sheep; that may well be true, but it may equally be true that there has been, at the same time, some obscure but nevertheless real deterioration in the food value of the mutton.

It is, of course, a well-known fact that the use of unbalanced manures, either natural or artificial, may have harmful effects on the nutritive value of a crop. Thus the excessive use of nitrate on a hay meadow may favour the coarse and innutritious grasses at the expense of the wild white clover and other desirable species; or the repeated use of sulphate of ammonia may cause the depletion of the lime reserves of the soil and thus produce a lime-deficient herbage that fails to satisfy the calcium requirements of the animal. These, however, are merely examples of harm arising from the wrong use of artificials.

An interesting experiment* that bears on the broad general question has recently been reported from the Veterinary Physiological Institute of the University of Leipzig. Two groups of rats were fed, for six successive generations, upon diets corresponding closely to an ordinary

* *Biochem. Zeit.*, 1934, 5-6. Summary in the *Jealott's Hill Agric. Res. Bull.*, Vol. IV, No. 3, March, 1935.

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mixed human diet, the only difference being that for one group (Group V) all the constituents of the ration had been produced with the use of chemical fertilizers, while for the other (Group U) the ingredients had all been produced without resort to artificials. For instance, the one group had beef from cattle fed on intensively manured pasture, while the other had the meat of cattle that had never consumed fodder grown with artificials. The diet was a good and very mixed one, including cereals (oats, barley and rye), vegetables (lettuce, spinach, cabbage, beans, peas, carrots, celery, tomatoes and potatoes), meat and milk. The conditions of the experiment seem to have been carefully controlled and the individual rats distributed at random between the two lots.

Most people would probably predict a negative or inconclusive result from such a test. Somewhat surprisingly, there were significant differences between the two groups, the differences being all in favour of Group V (artificials). The V-group rats of the parent generation seemed to be definitely more resistant to disease, and lived longer; of the first-generation progeny, Group V showed better general health, and the females continued to breed to greater ages; and taking all the generations the V group were more prolific and more vigorous.

These results should not, of course, be taken as suggesting that artificials are better than animal manures. The real explanation may possibly be that the farmer who uses artificials (in conjunction with dung, etc.) does, upon the whole, arrive at an improved balance of plant nutrients in the soil, and that this results in the production of a plant that, regarded as animal food, has an improved balance of minerals.

Nitrogen Fertilizers and Soil Reaction.—In his choice of nitrogen fertilizers the farmer is guided, in part, by considerations of the suitability of particular substances for particular purposes. For instance, sulphate of ammonia is a good fertilizer for potatoes, while nitrate of soda and nitro-chalk are suitable materials for the late-spring top-dressing of wheat. Again, most farmers are accustomed to compare the prices of the different fertilizers on the basis of the cost of the unit of nitrogen. A point that does not always receive due consideration is the varying effect of the different substances in wasting or conserving, as the case may be, the

NOTES ON MANURING

lime reserves of the soil. Naturally, if these lime reserves are practically unlimited or very easily replaced (e.g., on chalk or limestone land), the point scarcely arises. On the bulk of our British soils, however, the maintenance of a correct soil reaction necessitates the periodic application of lime, which costs money; and the use of a given fertilizer causes, in the long run, a definite increase or decrease in the necessary expenditure on lime.

In the following table* is given a list of the commoner nitrogen fertilizers with, opposite to each, the amount (in cwt.) by which the application of one ton of the fertilizer will increase or reduce the loss of carbonate of lime from the soil. The financial effect upon the farmer's lime bill is shown in the other columns, the figures being calculated on the assumption that carbonate of lime, by the time it has been applied to the soil, has cost the farmer 30s. per ton.

	<i>Effect, per ton of fertilizer, on wastage of carbonate of lime</i>		<i>Financial effect on farmer's lime bill</i>	
	<i>Increase</i>	<i>Decrease</i>	<i>Increase</i>	<i>Decrease</i>
Sulphate of Ammonia ..	21 cwt.	—	£1 11 6	—
Nitrate of Soda ..	—	5 cwt.	—	7s. 6d.
Nitro-chalk ..	—	—	Nil.	—
Cyanamide ..	—	11 cwt.	—	16s. 6d.
Nitrate of Lime ..	—	3½ cwt.	—	5s. 7d.

The farmer who is dealing with a lime-deficient soil should thus, when he is calculating the cost per unit of the various possible sources of nitrogen, first make allowance for the effect which the application will have upon his liming costs.

Bottle Feeding for Apple Trees.—The ordinary farmer, accustomed to deal with rather unexciting plants, like oats and turnips, must regard with astonishment some of the modern devices used by the fruit grower. For instance, the Victory oat is just that and “never nothing more”; whereas a Bramley or a Cox's Orange apple tree may be had in an infinite variety of forms according to the type of rootstock on which it is grafted and the system of pruning and training that is adopted. Again, if we carry out an experiment with turnips and express our results as pounds of dry matter per acre, there is not much more to be said; whereas the apple grower must give the closest attention to things like the size, colour, general appearance and flavour of his fruit.

* The figures are those of Pierre, and are quoted from Barker “The Use of Fertilizers,” 1935.

NOTES ON MANURING

One of the latest ideas from East Malling* is that of putting apple trees "on the bottle." In other words, since it is a tedious business to feed the trees by applying manure to the soil, they are to have their nutrients injected directly into their stems.

One of the difficulties in keeping orchards adequately and at the same time economically manured is the slowness of the response that the tree makes to a fertilizer applied to the soil in the usual way. Thus, if we suspect a potash deficiency, make a trial application on a small area, await results and then decide upon a general application, many years may elapse before the orchard as a whole will show benefit. The new method provides a much quicker means of discovering the needs of the tree. Moreover, it may quite conceivably prove useful as a means of feeding whole plantations.

The nutrient to be given is dissolved in enough water to make a solution of about one-quarter per cent. strength—1 lb. to 40 gal. The solution is held in any convenient container, which is supported at a level higher than that of the point where the injection is to be made. A hole of $\frac{1}{4}$ in. diameter is bored through the stem of the tree and a narrow glass tube is inserted at one end, with a collar of sponge rubber fitting close against the bark. The other end of the hole is blocked with a sponge-rubber stopper. The glass tube is connected to the container by means of a siphon, and, as soon as the pressure of the liquid has expelled the air from the hole, the apparatus is bound up to prevent leakage. The experiments have shown that, in summer, the tree gets a suitable amount of nourishment in a period of one to three days, leaf scorch setting in if the treatment is continued too long. One set of apparatus may thus be used to treat, in succession, a considerable number of trees.

In large-scale experiments, described in the 1934 Report, a group of Cox's Orange Pippin trees, twenty-one years old, received treatment, the operation being carried out in June. The solution contained $\frac{1}{4}$ per cent. of phosphate of potash and $\frac{1}{4}$ per cent. of urea, a substance containing nearly twice as much nitrogen as sulphate of ammonia and being also more easily utilized by the plant. Varying quantities of the solution were used, containing up to $\frac{1}{8}$ lb. of each nutrient per tree, equivalent to about 50 lb. per acre.

* See Annual Reports, East Malling Research Station, 1933 and 1934.

NOTES ON MANURING

The results were extremely promising. The treated trees produced up to two or three times as much shoot growth as the untreated—the increase varying with the amount of nutrients given. It is stated that the trees used for the experiment were already in vigorous growth, and that still more striking results would probably be obtained by operating on weakly specimens. The work well illustrates the remarkable ways in which scientific knowledge and human ingenuity are being brought to bear upon the life processes of the fruit tree.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended November 13					
	Bristol		Hull		L'pool	
	£ s. d.		£ s. d.		£ s. d.	
Nitrate of soda (N. 15½%) ..	7	12d	7	12d	7	12d
„ „ Granulated (N. 16%) ..	7	12d	7	12d	7	12d
Nitrate of lime (N. 13%) ..	7	0d	7	0d	7	0d
Nitro-chalk (N. 15½%) ..	7	5d	7	5d	7	5d
Sulphate of ammonia, Neutral (N. 20·6%) ..	6	10d	6	10d	6	10d
Calcium cyanamide (N. 20·6%) ..	6	10s	6	10s	6	10s
Kainite (Pot. 14%) ..	2	18	2	15	2	15
Potash salts (Pot. 30%) ..	4	18	4	15	4	13
„ „ (Pot. 20%) ..	3	15	3	12	3	10
Muriate of potash (Pot. 50%) ..	7	18	7	16	7	12
Sulphate „ „ (Pot. 48%) ..	9	8	9	6	9	6
Basic slag (P.A. 15½%) ..	2	10c	2	0c	..	2 6c
„ „ (P.A. 14%) ..	2	6c	1	16c	1	16c
Ground rock phosphate (P.A. 26·27½%) ..	2	15a	2	5a	2	8a
Superphosphate (S.P.A. 16%) ..	2	19	..	..	2	19f
„ „ (S.P.A. 13½%) ..	2	15	2	13	2	15f
Bone meal (N. 3½%, P.A. 20½%) ..	..	..	6	17	6	5h
Steamed bone-flour (N. ½%, P.A. 27½-29½%) ..	5	12	5	5	5	2h

Abbreviations; N.= Nitrogen; P.A.= Phosphoric Acid; S.P.A.= Soluble Phosphoric Acid; Pot.= Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

‡ Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

§ Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool, f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

¶ For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

|| Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

∫ Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails 1s. 3d. extra.

h Prices shown are f.o.r. Appley Bridge.

NOTES ON FEEDING

W. B. MERCER, M.C., B.Sc. (Principal), and Colleagues,
Cheshire School of Agriculture.

Calf Rearing.—The determination of the nutritive requirements of living animals is never a simple business. Fairly exact empirical knowledge the chemists have certainly won for us in the case of fattening beasts. Live weight increase is here a reliable if rough and ready indicator.

The young animal introduces an altogether different order of difficulty. Only a very bold man or a supremely ignorant one would in this case claim that growth rate is a reliable criterion upon which to found a scientific system of rationing. The young animal is a developing organism, but far too little is known of its adult physiology to enable anyone to design the ration needed to produce the adult body; one cannot lay the foundations of a building until the dimensions of the complete structure are known. Some little help one might expect to derive from that nebulous individual "the practical man." The view of the practical man on any of life's problems is seldom wholly right; it is a resultant of hereditary instinct, environmental influence and personal observation—often rather a blurred and fuzzy sort of resultant. On the other hand it is seldom very far wrong. Now and again it is patently inconsistent.

Dairy Calves.—Dairy stock afford a case in point. Nearly every dairy farmer known to us is of opinion that young heifers—up to the time of service at least—should be kept lean. Within limits it is held desirable to "bring 'em up rough." Dairy farmers rearing for *sale*, however, invariably get them into at least fresh condition; and buyers who are agreed as to the desirability of leanness vie with one another in bidding for animals that are manifestly not lean! Similarly, every buyer of a yearling dairy bull insists on having a fat young beefling. Pedigree breeders have long catered for public tastes by suckling (or at least milk feeding) bulls right up to the day of sale.

There is, it is true, a difference in the prospective work of males and females, the adult life of the female being probably the more strenuous; but there seems no reason why the sauce adjudged suitable for the goose should not

NOTES ON FEEDING

serve for the gander too. It is at least inconsistent to buy fat yearlings that someone else has reared if the buyer's own stock are deliberately kept lean.

The truth probably is that in home-rearing people's judgments are influenced by the desire to keep down costs while in buying everyone yields unconsciously to mass suggestion or to the specious promise of fat young animals—it is as profitless to inquire into the motives prompting bids at auctions, as it is to analyse some people's three-no-trump calls.

Most of the evidence available points to the desirability of keeping breeding animals lean. Fat animals seldom breed satisfactorily (though fatness seems still to be a *sine qua non* in show animals). The recognized dairy breeds are for the most part leaner than beef types. It seems difficult to get Ayrshire calves fat, no matter how they are fed. A Friesian calf remains lean on double the ration of a Shorthorn. Shorthorn calves appear to respond readily to varying rations, growing fat on the liberal ones and keeping lean on the more modest diets, and since most Shorthorns with a tendency to fat are usually poor milkers, it might be natural to conclude that stinted feeding in youth is desirable.*

Feeding Calves.—There are apparent inconsistencies in the average feeder's position regarding young stock also, though they can be explained more easily, and in any event they have little bearing on the theory of rearing. Most people who rear their own calves do them pretty well. Yet it is probably true to say that the average feeder prefers to buy lean young stock "of the right sort" in preference to animals in fresh condition, because he believes that the former make the most rapid gains. Experiment has, however, failed to give any consistent answer to the question whether such animals do in fact grow quicker than comparable beasts that have been better done, still more whether they make the more economical use of their food. Such experiments are, in fact, exceedingly difficult to run; in particular, it is difficult to make sure that the differently treated lots have similar inherent capacities for growth. In

* It may be that herein lies a confusion of cause and effect. It is quite possible that the young animal that grows fresh as a yearling and ultimately makes a poor milker would have made a poor milker anyhow. Possibly the response to liberal feeding in early life could be used as a criterion of milking capacity.

NOTES ON FEEDING

other words, feeders expressing a preference for lean beasts "of the right sort" may unknowingly be expressing preference for "the right sort," not for the leanness.

If this be accepted as a fair explanation, the practical man's view on the theory of rearing may (apart from obvious health effects) be summed up thus:—

A calf destined for feeding should be made to grow as fast and as economically as possible. Rations must therefore be judged by simple arithmetical calculations of pounds live weight and pounds sterling.

A calf destined for dairying should be made to grow at a controlled rate—with Shorthorns about $1\frac{1}{2}$ lb. per day. Rations must be judged by their capacity to produce that rate of live weight increase. The task of designing a ration for dairy calves is therefore a relatively simple one.

Vague as these conclusions are, they must perforce content us for the time being; until the science of animal physiology is further advanced than at present it is scarcely possible to do more, in the search for a foundation to scientific rearing, than to analyse and collate the very varied rations that are or have been successfully employed in practice.

Raw and Pasteurized Milk.—McCandlish and Black have recently given us a useful lead in their study on the relative values of raw and pasteurized milk—published in one of those widely conceived and admirably produced bulletins that we have come to associate with the Advisory Department of the West of Scotland Agricultural College. It is no simple matter to measure the values of foodstuffs so closely allied as raw and pasteurized milk. The issue is complicated by time factors as well as by unavoidable inherent differences in the stock used. Despite the fact that 35 calves were reared for periods of 120 or more days, the differences in growth rates of the "raw" and "pasteurized" groups was neither large nor consistent; it seems doubtful whether they were "significant" in the mathematical sense. The records of scour, however, teach a clear enough lesson; calves fed on pasteurized milk are more subject to this trouble than are calves on raw milk. (This is an important point for the owner of tuberculin-tested herds, anxious at one and the same time to rear as

NOTES ON FEEDING

many of his own stock and to sell as much of his expensively produced milk as he can: evidently the solution of his difficulties does not at present lie in the purchase and pasteurization of ordinary milk.)

Clear enough also is the evidence as to the value of the dam's milk in the early life of the calf. Judged from any standpoint, the calves receiving their own dam's milk for ten days thrive better than those receiving it for five days only. Ten days is not too long to keep a calf on the milk of its own dam—a proviso which needs to be chalked up plainly amongst rearing rules on dairy farms.

All farmers are agreed that some degree of "bloom" is desirable in all calves. One can, however, argue little from this, since "bloom" appears to be an indicator rather than a factor in health—a result, not a cause. Considering the importance attaching to health and growth rate, it seems strange that so little attention has been given to exercise. Almost universally, however, exercise is left to chance, animals are turned out or not turned out for a variety of reasons—cheapness, "hoost" or to "keep the sun off their backs"—but rarely if ever is exercise taken into account. Still less are rations varied according to the amount of exercise given. *A priori* it seems to us likely that exercise and sunlight are of immense consequence in early life.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	s.	£ s.	£ s.		s. d.	d.	%
Wheat, British	6 3	0 8	5 15	72	1 7	0.85	9.6
Barley, British feeding	5 10	0 8	5 2	71	1 5	0.76	6.2
" Canadian, No. 3 Western ..	5 7	0 8	4 19	71	1 5	0.76	6.2
" Persian	5 7	0 8	4 19	71	1 5	0.76	6.2
" Russian	5 7	0 8	4 19	71	1 5	0.76	6.2
Oats, English, white	6 10	0 8	6 2	60	2 0	1.07	7.6
" " black and grey	6 10	0 8	6 2	60	2 0	1.07	7.6
" Canadian, No. 2 Western ..	7 5	0 8	6 17	60	2 3	1.21	7.6
" " mixed feed	6 7	0 8	5 19	60	2 0	1.07	7.6
Maize, Argentine	4 5	0 6	3 10	78	1 6	0.54	7.6
" South African, No. 4, yellow	4 17	0 6	4 11	78	1 2	0.52	7.6
" " " No. 2, white, Flat	5 0	0 6	4 14	78	1 2	0.62	7.6
Beans, English, Winter	5 15	0 16	4 19	66	1 6	0.80	19.7

Continued overleaf

PRICES OF FEEDING STUFFS (*continued*)

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Peas, English Blue	9 0 ⁸	0 14	8 6	69	2 5	1-29	18-1
„ Indian	9 0 ⁸	0 14	8 6	69	2 5	1-29	18-1
„ Japanese	17 7 ¹	0 14	16 13	69	4 10	2-50	18-1
Dari	7 5 ¹	0 7	6 18	74	1 10	0-98	7-2
Milling offals—Bran, British	6 5	0 14	5 11	43	2 7	1-38	9-9
„ „ „ broad	6 17	0 14	6 3	43	2 10	1-52	10
Middlings, fine, imported	6 10	0 12	5 18	69	1 9	0-94	12-1
Westings†	6 7	0 13	5 14	56	2 0	1-07	10-7
„ „ Superfine†	7 0	0 12	6 8	69	1 10	0-98	12-1
Pollards, imported	5 17	0 13	5 4	50	2 1	1-12	11
Meal, barley	6 12	0 8	6 4	71	1 9	0-94	6-2
„ „ grade II	5 17	0 8	5 9	71	1 6	0-80	6-2
„ „ maize	5 0	0 6	4 14	78	1 2	0-62	7-6
„ „ South African	4 17	0 6	4 11	78	1 2	0-62	7-6
„ „ germ	5 0	0 10	4 10	84	1 1	0-58	10-3
„ locust bean	7 15	0 5	7 10	71	2 1	1-12	3-6
„ bean	8 0	0 16	7 4	66	2 2	1-16	19-7
„ fish	14 15	1 19	12 16	59	4 4	2-32	53
Maize, cooked, flaked	5 15	0 6	5 9	84	1 4	0-71	9-2
„ „ „ gluten feed	5 10	0 12	4 18	76	1 3	0-67	19-2
Linseed cake, English, 12% oil ..	8 5	0 19	7 6	74	2 0	1-07	24-6
„ „ „ 9% „	7 15	0 19	6 16	74	1 10	0-98	24-6
„ „ „ 8% „	7 10	0 19	6 11	74	1 9	0-94	24-6
„ „ „ 6% „	7 17 ⁸	0 19	6 18	74	1 10	0-98	24-6
Soya-bean cake, 5½% oil	8 2 ⁸	1 6	6 16	69	2 0	1-07	36-9
Cottonseed cake, English, Egyptian	4 17	0 16	4 1	42	1 11	1-03	17-3
seed, 4½% oil							
„ „ „ Egyptian 4½% „ ..	4 12	0 16	3 16	42	1 10	0-98	17-3
„ „ „ decorticated 7% „ ..	7 0 ¹	1 6	5 14	68	1 8	0-89	34-7
„ „ „ meal, decorticated, 7% „ ..	7 0 ¹	1 6	5 14	70	1 8	0-89	36-8
Coconut cake, 6% oil	6 7	0 16	5 11	77	1 5	0-76	16-4
Ground nut cake, 6-7% oil	6 10*	0 17	5 13	57	2 0	1-07	27-3
„ „ „ decor., 6-7% oil ..	7 7	1 6	6 1	73	1 8	0-89	41-3
„ „ „ imported decorti- cated 6-7% oil	6 17	1 6	5 11	73	1 6	0-80	41-3
Palm-kernel cake, 4½-5½% oil ..	6 2 ¹	0 11	5 11	73	1 6	0-80	16-9
„ „ „ „ meal 4½% oil ..	6 0 ¹	0 11	5 9	73	1 6	0-80	16-9
„ „ „ meal, 1-2% oil	5 12	0 11	5 1	71	1 5	0-76	16-5
Feeding treacle	4 12	0 8	4 4	51	1 8	0-89	2-7
Brewers' grain, dried ale	5 2	0 10	4 12	48	1 11	1-03	12-5
„ „ „ „ porter	4 15	0 10	4 5	48	1 9	0-94	12-5
Dried sugar-beet pulp (a)	5 10	0 5	5 5	66	1 7	0-85	5-2

(a) Carriage paid in 5 ton lots. * At Bristol. † At Hull. ‡ At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of October, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.09d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—N., 6s. 8d.; P₂O₅, 2s. 1d. K₂O, 3s. 4d.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculation are as follows:—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6.2	5 7
Maize	78	7.6	4 5
Decorticated ground-nut cake ..	73	41.3	7 2
„ cottonseed cake ..	68	34.7	7 0

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1 27 shillings, and per unit protein equivalent, 1.61 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

In accordance with the recommendation of this Committee the 'food values' given in the following table may be taken as applicable to the ensuing four months, December to March, inclusive, for the purposes of advisory schemes in the rationing of dairy cows.

FARM VALUES.

CROPS	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent	Per cent.	£ s.
Roots			
Kohl Rabi	8	0.5	0 11
Mangolds	7	0.4	0 10
Potatoes	18	0.8	1 4
Swedes	7	0.7	0 10
Turnips	4	0.4	0 6
Green Foods—			
Cabbage, drumhead ..	7	0.9	0 10
„ open-leaved ..	9	1.5	0 14
Kale, marrow stem... ..	9	1.3	0 14
Silage, vetch and oats ...	13	1.6	0 19
Hay—			
Clover hay	38	7.0	3 0
Lucerne hay	29	7.9	2 10
Meadow hay, poor	22	2.9	1 13
„ „ good... ..	37	4.6	2 14
„ „ very good	48	7.8	3 14
Seeds hay	29	4.9	2 5
Straws—			
Barley straw	23	0.7	1 10
Bean straw	23	1.7	1 12
Oat straw	20	0.9	1 7
Wheat straw	13	0.1	0 17
Grains and seeds—			
Barley	71	6.2	5 0
Beans	66	19.7	5 16
Oats... ..	60	7.6	4 8
Peas... ..	69	18.1	5 17
Wheat	72	9.6	5 7

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2., price 6d., post free 7d.

Agricultural Returns of England and Wales, 1935

PRODUCE OF HOPS.

PRELIMINARY STATEMENT showing the ESTIMATED TOTAL PRODUCTION of HOPS in the years 1935 and 1934, with the ACREAGE and ESTIMATED AVERAGE YIELD per STATUTE ACRE in each COUNTY of ENGLAND in which Hops were grown, and the AVERAGE YIELD per ACRE of the TEN YEARS 1925-1934.

Counties, etc.		Estimated Total Produce		Acreage returned in June		Estimated Average Yield per Acre		Average of the ten years 1925 - 1934
		1935	1934	1935	1934	1935	1934	
		Cwt.	Cwt.	Acres	Acres	Cwt.	Cwt.	Cwt.
Kent	East ...	35,500	37,500	2,051	2,097	17.3	17.9	14.8
	Mid ...	44,200	48,500	2,969	2,862	14.9	16.9	13.5
	Weald ...	66,600	70,600	5,122	5,050	13.0	14.0	12.3
	Total, Kent	146,300	156,600	10,142	10,009	14.4	15.6	13.2
Hants	...	7,100	7,800	573	583	12.4	13.4	11.6
Surrey	...	1,600	1,600	110	93	14.8	17.6	11.1
Sussex	...	19,800	22,500	1,462	1,420	13.5	15.9	12.6
Hereford	...	47,600	45,700	3,998	4,016	11.9	11.4	10.5
Worcester	...	25,000	24,000	1,901	1,851	13.1	13.0	9.9
Other Counties*	...	900	800	65	65	13.8	12.2	11.1
Total	...	248,300	259,000	18,251	18,037	13.6	14.4	12.3

* Salop, Gloucester, and Berkshire

NOTE.

The total acreage under hops returned in June, 1935, by occupiers of agricultural holdings exceeding one acre in extent was slightly larger than that of the previous year. The increase, which amounted to 214 acres, is the result of small additions to the acreages in the Mid and Weald Divisions of Kent, in Sussex and in Worcestershire. The total production is estimated at 248,300 cwt. or 10,700 cwt. less than in 1934, and about 15,000 cwt. below the average for the ten years 1925-34.

Hops grown by brewers for their own use, or sold by producers under registered contracts, do not come under the marketing provisions of the Hops Marketing Scheme. For this reason the quantity of hops consigned for sale to the Hops Marketing Board is less than the estimated total production of 248,300 cwt.

The average yield per acre over the whole of the hop growing areas is estimated to be 13.6 cwt. compared with an average of 12.3 cwt. for the previous ten years, and of 14.4 cwt. in 1934. In Kent, which returned more than half the total hop acreage, and nearly 60 per cent. of the total production, the yield per acre was estimated at 14.4 cwt. as compared with 15.6 cwt. last year. All the counties in which hops are grown to an appreciable extent, with the exception of Worcester, record lower yields than last year.

MISCELLANEOUS NOTES

The weather conditions were on the whole favourable to the crop, which appears to be free from disease while the quality is reported to be generally good. The September gales, however, caused some damage to the crop and the later pickings were inclined to be discoloured. The area left unpicked was estimated to be 632 acres as compared with 273 acres in 1934. This increase was due in some measure to the inclement weather experienced during the picking season.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE general index number of the prices of agricultural produce for October at 113 (Base 1911-13 = 100) was 8 points lower than that for the previous month and 2 points below that recorded for October, 1934. (If allowance be made for payments under the Wheat Act, 1932, and the Cattle Industry (Emergency Provisions) Act, 1934, the revised general index for the month under review would be 120.) Values for wheat, fat sheep, dairy cows, store cattle and sheep, eggs, butter and cheese showed an increase over September, but barley, fat cattle, bacon pigs and store pigs were cheaper. These movements, however, were mostly of a seasonal character, the main factor accounting for the fall in the general index being the lower index for milk, which was reduced by 44 points from the abnormal level recorded in the previous month, when the contract price was on the winter scale compared with the summer price scale in force in September in the base period 1911-13.

Monthly index numbers of prices of Agricultural Produce.
(Corresponding months of 1911-13 = 100.)

Month	1930	1931	1932	1933	1934	1935
January	148	139	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	114
August	135	121	105	105	119	113
September	142	120	104	107	119	121
October	129	113	100	107	115	113
November	129	112	101	109	114	—
December	126	117	102	110	113	—

Grain.—The average of wheat prices at 5s. 11d. per cwt. was 1s. 1d. higher than in the previous month and the index rose 16 points to 80. (If the deficiency payment under the Wheat Act is included, the index would be 126.) Barley was cheaper than in September by 7d. per cwt., the index

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declining from 121 to 110, while oats, although 1*d.* dearer at 6*s.* 2*d.* per cwt., were 1 point lower with an index of 89, owing to a proportionately greater rise in the base period. In October, 1934, wheat averaged 5*s.*, barley 9*s.* 5*d.*, and oats 6*s.* 6*d.* per cwt., the respective indices being 67, 111 and 94.

Live Stock.—Fat cattle prices declined a little during the month, and the average of 30*s.* 10*d.* per live cwt. for second quality was 8*d.* less than in September and 1*s.* 9*d.* lower than a year ago. The index at 92 showed a reduction of 2 points on the September figure and was 5 points lower as compared with October, 1934. (The effect of adding the cattle payment of 5*s.* per live cwt. would be to raise the current index to 107.) Fat sheep at 8 $\frac{3}{4}$ *d.* per lb. for second quality were $\frac{1}{2}$ *d.* dearer and the index moved upwards by 7 points to 121; this, however, was still 7 points below the index for October, 1934. Values for bacon pigs were lower by 4*d.* per score and the index fell 3 points to 90, but porkers were dearer by 2*d.* per score, the index rising from 98 to 99. Dairy cows and store cattle were both higher in price, the former by about 20*s.* and the latter by about 10*s.* per head, while the indices advanced by 2 points each to 107 and 90 respectively. Store sheep also were dearer, but on account of a larger increase taking place in the corresponding months of 1911-13, the index fell by 4 points to 120. Quotations for store pigs moved downward, but the index at 124 was 2 points higher.

Dairy and Poultry Produce.—The September index of 215 for milk was abnormally high, owing to the fact that the regional contract price was fixed at winter level. The price for October, however, although 1*d.* per gallon more than in September, was comparatively normal and the index of 171, computed on the winter base price of 1911-13, has, consequently, reverted to a more normal figure. A year ago the index for milk was 161. Farm butter realized 1 $\frac{1}{4}$ *d.* per lb. more than in the preceding month and the index at 95 showed an increase of 6 points. Values for cheese also were higher, the index rising from 78 to 82. As regards eggs, the seasonal rise in price of about 2 $\frac{3}{4}$ *d.* per dozen was proportionately less than that recorded during the base years and the index fell from 119 to 118. This figure was, however, 3 points higher than in October, 1934. Poultry was practically unchanged on the month.

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Other Commodities.—Although the index for potatoes at 152 was 5 points above that for September, average quotations were increased by only 1s. per ton. Hay prices continued to decline, the combined index dropping by 4 points to 91. Apples generally were cheaper, as also were most of the vegetables used in compiling the index. Wool was unchanged either in price or index.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity	1933	1934	1935			
	Oct.	Oct.	July.	Aug.	Sept.	Oct.
Wheat	65	67	68	60	64	80
Barley	120	111	88	103	121	110
Oats	78	94	99	92	90	89
Fat cattle	99	97	93	92	94	92
„ sheep	107	128	117	114	114	121
Bacon pigs	97	99	101	98	93	90
Pork „	110	112	97	97	98	99
Dairy cows	114	107	100	102	105	107
Store cattle	89	85	94	89	88	90
„ sheep	86	114	113	111	124	120
„ pigs	139	143	114	118	122	124
Eggs	112	115	114	133	119	118
Poultry	122	116	120	115	117	117
Milk	157	161	175	175	215	171
Butter	98	84	87	92	89	95
Cheese	103	93	99	85	78	82
Potatoes	110	151	166	137	147	152
Hay	74	101	99	101	95	91
Wool	79	85	86	89	89	89

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	128	117	107	117	124	126
Fat Cattle	—	112	107	107	109	107
General Index	112	121	120	120	128	120

Agricultural Statistics (Part I), 1934

THE Ministry's annual report on the acreage and production of crops and the numbers of live stock in England and Wales in 1934 is now available. The report contains information as to the acreage of crops, the numbers of live stock (including poultry), and the numbers of agricultural workers actually in employment on June 4, as returned by the occupiers of agricultural land exceeding one acre in

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extent. Particulars are also given of the production of the various crops and of live stock products, including meat, milk, eggs and wool. The tables attached to the report contain detailed figures for each county in England and Wales of the acreage under each crop, the numbers of each class of live stock, and the estimated yield per acre of the principal crops for the years 1934 and 1933. Summaries for Great Britain and the United Kingdom for the last ten years are also given.

The report forms Part I of the Agricultural Statistics of England and Wales, 1934, and may be obtained through any bookseller, or directly from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, price 1s. 6d., post free 1s. 8d.

Agricultural Machinery Testing Committee

THE undermentioned Certificates and Reports issued by the Ministry, have been published in pamphlet form:—

- No. 58. The Clifton Electric Sterilizer.
- No. 60. The Avery Bulk Milk Scale Tank.

The tests were conducted at the National Institute for Research in Dairying, Shinfield, near Reading.

- No. 59. The F.W. Grader.

This test was conducted at the South-Eastern Agricultural College, Wye, Kent, in collaboration with the Institute for Research in Agricultural Engineering, University of Oxford.

Copies of the respective pamphlets may be obtained through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. The price of No. 58 is 2d., post free 2½d., of No. 59, 3d., post free 3½d., and of No. 60, 2d., post free 2½d.

Farm Workers' Minimum Rate of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1, on November 15, 1935, the Rt. Hon. the Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Dorset.—An Order continuing the operation of the existing minimum and overtime rates from December 8, 1935 (i.e., the day following that on which the existing rates are due to expire), until June 30, 1936. The minimum rates are (a) for male workers of 21 years of age and over 31s. 6d. per week of 53½ hours in summer, except in the weeks in which Good Friday, Easter Monday and Whit Monday fall when the hours are 44, and 48 hours in winter, except in the week in which Christmas Day and Boxing Day fall when the hours are 31; (b) for female workers of 21 years of age and over (other than part-time and casual workers) 24s. per week

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of 48 hours except in the weeks in which Good Friday, Easter Monday and Whit Monday fall when the hours are 39½, and in the week in which Christmas Day and Boxing Day fall when the hours are 31 with in addition in the case of all workers referred to above not more than 3 hours on Good Friday, Easter Monday, Whit Monday, Christmas Day and Boxing Day respectively on work in connexion with milking and the care of and attendance upon stock, and (c) for part-time or casual female workers of 18 years of age and over 5*d.* per hour. The overtime rates are 8*d.* per hour for male workers of 21 years of age and over (except for overtime employment in the hay harvest when the rate is 9*d.* per hour) and 6*d.* per hour for all classes of female workers of 20 years of age and over.

Yorkshire: East Riding.—(1) An Order fixing minimum and overtime rates to come into force on November 24, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until November 23, 1936. The minimum rate for all male workers of 21 years of age and over is 33*s.* 6*d.* per week of 52½ hours in summer, except in the week in which Good Friday falls when the hours are 43, and 48 hours in winter except in the week in which Christmas Day falls when the hours are 39½, with in addition in the case of workers living in not more than 12 hours per week on weekdays and 3 hours on Sunday spent on the care of and attention to stock. The overtime rates of wages for male workers of 21 years of age and over are unchanged at 10*d.* per hour on weekdays and 1*s.* per hour on Sundays, Good Friday and Christmas Day. The minimum rates for female workers of 16 years of age and over remain unchanged at 6*d.* per hour with overtime at 9*d.* per hour.

(2) An Order fixing differential rates of wages for overtime employment on the corn harvest of 1936, the rate for all male workers of 21 years of age and over being 1*s.* 3*d.* per hour. For female workers of 16 years of age and over the rate is 11*d.* per hour.

Yorkshire: North Riding.—An Order fixing minimum and overtime rates to come into force on November 24, 1935 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until November 23, 1936. The minimum rate for male workers of 21 years of age and over (other than casual workers) is 33*s.* (instead of 32*s.* 6*d.* as at present) per week of 50 hours in winter except in the week in which Christmas Day falls when the hours are 41, and 52½ hours in summer with payment for employment in connexion with the care of and attendance upon animals where the total hours exceed the number mentioned above unchanged at 3*d.* per hour for those workers who are boarded and lodged by their employer, and 6*d.* per hour for those who are not so boarded and lodged. The rates for overtime employment are 9*d.* per hour on weekdays and 11*d.* per hour on Sundays and Christmas Day. For male casual workers of 18 years of age and over the minimum rate is unchanged at 7*d.* per hour for all time worked. For female workers of 18 years of age and over the minimum rate is 6*d.* per hour. For whole-time female workers provision is made for payment at not less than 22*s.* per week of 36 hours in the week in which Christmas Day falls and 44 hours in any other week with overtime at 9*d.* per hour.

Anglesey and Cuernavon.—An Order varying the existing minimum and overtime rates for workers (other than male workers in forestry) the rates as varied to come into force on December 1, 1935. The minimum rate for male workers of 21 years of age and over wholly or mainly employed as horsemen, cowmen, shepherds

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or hwsmyrn (bailiffs) is 35s. (instead of 34s. as at present) per week of 58 hours. For other male workers of similar age the minimum rate is 31s. (instead of 30s. 6d. as at present) per week of 50 hours. The overtime rate for all classes of male workers of 21 years of age and over remains unchanged at 9d. per hour. The minimum rate for female workers of 18 years of age and over remains unchanged at 6d. per hour.

Denbigh and Flint.—(1) An Order continuing the operation of the existing minimum and overtime rates for workers (other than male workers wholly or mainly employed in forestry) from February 16, 1936 (i.e., the day following that on which the existing rates are due to expire), until February 15, 1937. The minimum rate for male workers of 21 years of age and over employed wholly or mainly as team-men, cattlemen, cowmen, shepherds or bailiffs is 35s. 6d. per week of 60 hours. For other male workers (except casual workers) of 21 years of age and over the minimum rate is 30s. 6d. per week of 48 hours in winter and 50 hours in summer. The overtime rate for male workers of 21 years of age and over (other than casual workers) is 9d. per hour. The minimum rate for casual male workers of 21 years of age and over is 8d. per hour for all time worked. For female workers of 18 years of age and over the minimum rate is 5d. per hour for a week of 48 hours with overtime at 6½d. per hour.

(2) An Order continuing the operation of the existing minimum and overtime rates for male workers employed wholly or mainly in forestry from February 16, 1936, to February 15, 1937. For workers of 21 years of age and over the rate is 35s. per week of 50 hours with overtime at 9d. per hour.

Enforcement of Minimum Rates of Wages.—During the month ending November 14, 1935, legal proceedings were taken against twelve employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow:—

Committee Area	Court	Fines imposed			Costs allowed			Arrears of wages ordered			No. of workers involved	
		£	s.	d.	£	s.	d.	£	s.	d.		
Cornwall ...	Penzance ...	5	0	0	1	0	0				5	
" ...	Camelford ...	1	0	0	—			5	0	0	1	
Devon ...	S. Molton ...		†		1	9	0	8	0	0	1	
Durham ...	Darlington	4	0	0		4	0	51	10	0	2	
Lancashire ...	Chorley ...	2	0	0	3	3	0	33	0	0	1	
Suffolk ...	Lowestoft ...	1	0	0	4	4	0	5	18	6	2	
" ...	"	2	0	0		15	0	33	1	2	4	
" ...	"		10	0	2	2	0	2	5	9	1	
" ...	Framlingham		†			13	0	2	11	9	1	
Yorks, N.R.	Scorton ...		†		1	1	0	45	6	0	2	
Yorks, W.R.	Goole ...	10	0	0	1	0	0	48	10	2	2	
Glamorgan	Penmaen ...	2	0	0	—			16	16	0	1	
		£	27	10	0	15	11	0	251	19	4	23

* Arrears not yet determined: Court laid down a basis for calculation.

† Dismissed under the Probation of Offenders Act.

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Foot-and-Mouth Disease.—Outbreaks of Foot-and-Mouth Disease were confirmed on November 26 at Adlington, Macclesfield, Cheshire, and, on November 27, at Catsfield, Battle, East Sussex. Orders have been made declaring Infected Areas of approximately 15 miles' radius round each of the infected premises.

WIRELESS TALKS TO FARMERS IN DECEMBER

<i>Station</i>	<i>Date Dec.</i>	<i>Time p.m.</i>	<i>Speaker</i>	<i>Subject</i>
National	4, 11, 18	7.5	Professor J. A. Scott Watson and others	For Farmers Only.
North	13	6.30	Mr. W. B. Mercer	Making Hay without Sunshine
West	4	7.45	Mr. A. W. Ling and others	Meet at Barnstaple for the Fat Stock Show
	12	6.30	Messrs A. W. Ling and W. B. Thompson	Impressions of Smith- field Fat Stock Show
	19	6.30	Mr. F. W. Harvey	For Western Farmers
Welsh	19	6.30	Mr. John Jones (in Welsh)	The Sheep Dog
Midland	4	10.10	Mr. S. L. Bensusan	Back to the Land : Leicester, Notts and Northampton
	12	6.30	Messrs. W. B. Thompson and A. W. Ling	Discussion on the Smithfield Show
	13	6.30	Mr. Graham Castle	Our Country Corres- pondent: Gloucester- shire
N. Ireland	6	7.15	Mr. D. A. E. Harkness	Milk Marketing Pro- gress
	13	7.25	Mr. Peter Fitzpatrick	Farmers' Work and Worry
	20	7.15	Mr. J. McAllan	The Veterinary Office and the Farmer
Scottish	5	7.10	Mr. Allan Carruth	The Smallholder: his Work and Prospects
	13	6.50	Mr. A. D. Buchanan Smith	For Scottish Farmers

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APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS

ENGLAND

Devonshire.—Mr. G. K. Read, B.Sc. (Agric.), N.D.P., has been appointed Assistant Instructor in Poultry-keeping, *vice* Mr. R. D. H. Bridge, N.D.P.

WALES

Merionethshire.—Mr. D. M. Jones, B.A., has been appointed County Horticultural Instructor, *vice* Mr. R. P. Thomas, N.D.H.

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Migration and Planes of Living. By C. Goodrich, B. W. Allin and M. Hayes. Pp. viii + 111, 4 Maps. (London: Humphrey Milford; Philadelphia: University of Pennsylvania Press. 1935. Price 4s. 6d.)

This monograph, by three statisticians of the Industrial Research Department of the University of Pennsylvania, studies the migration movements of the population of the United States since 1920, in relation to standards of living and the effects of the depression.

Between 1920 and 1930, there was a net migration of no fewer than six million people from the farms of the United States, chiefly towards the cities, and especially the large cities of the North. The chief reasons seem to have been the good wages and good employment of the cities during this decade, as contrasted with the submarginal conditions that prevailed over sections of the agricultural area, especially some of the cotton States, and perhaps also the displacement of farm labour by technical inventions. After 1930 a reverse tide set in. The drastic cuts in urban wage rates during the slump, and still more so the acute contraction of city employment, led to a decline in the population of many cities and to corresponding increases in the rural areas. Since 1933, however, it appears that industrial recovery has proceeded so far as to re-establish the former movement citywards.

The authors of this book have endeavoured to discover whether the population movements in these periods have been movements from localities of less to localities of greater prosperity, whether the prosperity be measured by the standard of living absolutely or by its resistance to deterioration during depression. For their measurement of standard of living they use an index compounded of income tax returns, radio sets and domestic telephones; this is supported by Census statistics of agricultural income in 1929, by wage, income and retail sales statistics, 1929 and 1933, and by poor relief statistics for 1933-34. The greater part of the book is occupied by the cross-classification of all these factors according to States, counties, soil regions, etc., and the presentation is assisted by numerous tables and excellent maps.

On the whole it emerges clearly enough that the pre-depression movements were governed by the relative economic advantages of the better agricultural regions over the worse, and still more so, of the cities over the country. Many of the worse regions were already chronically bad, even before 1930, and some of them have since been scheduled for eventual withdrawal from agriculture. On the other hand, the rural areas of emigration did not suffer as acutely from the depression as did some of the areas of immigration, and the migrations did not on the whole make for extra stability of employment and earnings.

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The reverse movement away from the cities after 1930 was, in contrast to that of the previous decade, a movement toward poorer areas. This seems to have been due chiefly to a return of the migrants to their former homes, for the purpose of "doubling-up" with farm relatives, or in the hope of making a living off land formerly considered unprofitable. This tendency was most noticeable in areas of "subsistence farming" ready of access from large cities. It was aggravated by a fact to which the authors give perhaps insufficient emphasis, namely the greater expulsive effect of unemployment in a town compared with a poor living in a country area of equal average income. As industrial recovery continues and urban employment improves, the authors will expect to find a swelling of the present movement back to the towns.

These are the main trends established by the study. One of the morals drawn is that, while the migrations generally reflected the balance of economic inducement, they were nevertheless haphazard and sometimes insufficient in volume, and therefore in the future will required planned direction. Since the 1930-33 movement carried people back to some of the worst land the authors argue that it should not be permitted to recur except in an emergency. The English reader, in addition to appreciating the importance of these conclusions, will be moved to much reflection by the immense mobility of the American population and its ready interchangeability between town and country. It would be of great interest to contrast these conditions with the relative stability of the English farm and town populations, and to connect this stability with such factors as the more intensive and specialized nature of our farming, and our more comprehensive systems of unemployment and poor relief.

Lilies: Their Culture and Management. By H. Drysdale Woodcock and J. Coutts. Pp. xv + 242, 131 Figs. (London. Country Life, Ltd. 1935. Price 15s.)

The modern tendency towards specialization has not only affected trade growers, but also amateur gardeners, many of whom take a single species or group of plants for their special hobby, and so immense is the number of new plants now available that nothing is thereby lost in variety or length of the flowering season in the garden. In recent years, lilies have come much to the fore, largely through the work of collectors and explorers, and have quickly become a "speciality" for a number of amateurs. It is for these growers that the book now under review is primarily written, although it is sufficiently attractive to draw many fresh recruits into the ranks of lily enthusiasts. It is also an authoritative guide that will be a reference book of great value to nurserymen as lily raisers. The production of lily flowers on a commercial scale is not, however, dealt with, for the theme of the book is the lily as a garden flower.

Part I consists of general chapters on the cultivation and choice of lilies, and much useful information is given concerning soils and planting, lilies having different requirements. The chapter on propagation is of outstanding merit, and full of sound advice derived from practical experience. Part II forms the larger part of the book, and contains an alphabetical list of all the recognized species of lilies with as many as possible of their sub-species, varieties and forms; and it is to this part that growers will be constantly referring for concise but reliable information concerning the nomenclature, origin and cultivation of the lilies described. A useful bibliography is given in an Appendix. The illustrations, which include over 100 excellent photographs of lilies, are a specially attractive feature.

The collaboration of a practical gardener and enthusiast, with an eminent curator at Kew Gardens has indeed been successful in producing a book that is attractive, practical and encyclopædic.

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Botany: Principles and Problems. By Edmund W. Sinnott, Professor of Botany, Barnard College, Columbia University. 3rd Ed. Pp. xix + 525 and 310 Figs. (London: McGraw-Hill Publishing Co., Ltd. 1935. Price 21s.)

Students have now little excuse to regard botany as a "dry-as-dust" science remote from every-day life. This addition to the number of modern text-books is bound to attract and hold the interest of the student; the subject matter is very clearly set out and explained, starting from the assumption that no previous study of botany has been made. Yet it covers a very wide field. The illustrations are exceptionally good, and will be of assistance to the student, as well as to the teacher for blackboard copying. A feature is made of "subjects for thought and discussion," but no references to any original papers are included—this is unfortunate, for the British honours-degree student requires deeper knowledge than that provided by a text-book, while for the research worker a very wide bibliography is essential. For the Intermediate B.Sc. student, however, this will be recognized as one of the most useful text-books now available.

Problems in Soil Microbiology. By D. Ward Cutler and Lettice M. Crump. Pp. vii + 104. 18 Figs. and 32 Tables. (London: Longmans, Green & Co. 1935. Price 9s.)

This volume is the sixth of the series of Rothamsted Monographs on Agricultural Science, but it differs a good deal in character from its forerunners, as it is the book form of a group of lectures delivered in 1934-35 by one of the authors. It is not, as they are careful to record, a text-book of soil microbiology. Thus, in spite of some suggestion to the contrary in the title, it forms proper material for reading for the wider public interested in the processes and interrelations of life, in this instance in perhaps the least known environment, the soil. In a narrower field it will serve teachers of biology and agriculture as a book of reference where old views have given place to new, based on the work of the General Microbiology Department of the Rothamsted Experimental Station. The treatment and language is not difficult for readers acquainted with the biological sciences, and the book itself is a serviceable production.

Agrarianism: A Program for Farmers. By Troy J. Cauley. Pp. xi + 211. (London: Humphrey Milford. Chapel Hill: University of North Carolina Press. 1935. Price 7s.)

This book presents in a readable manner the case for agrarianism in the United States of America—a policy that may be defined as an economic and social system under which the chief method of subsistence is that of tilling the soil, of farming not so much to make a profit, but as a mode of life, with a consequent rather wide dispersion of population and a relative meagreness of commercial intercourse. Following a brief outline of the present American economic system and its influence on the agriculture of the country, the author proceeds to describe the commonly accepted capitalistic and socialistic remedies for agriculture, pointing out their inherent weaknesses.

Additional chapters deal in greater detail with the agrarian system, pointing out its intrinsic merits from the national, social and economic standpoints. It is admitted that where traces of the system have endured in the Southern States, the standard of living and the general cultural level of the agricultural population are somewhat unsatisfactory, but it is maintained that these defects would be removed with the more general adoption of an agrarian policy. In common with other countries America has her agricultural problems, and the publication of this volume is opportune inasmuch as agricultural policy is also receiving considerable attention in Great Britain.

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The Cause and Control of Swarming in Bees. Conference Report No. XX. Pp. 31. (Obtainable from the Secretary, Rothamsted Experimental Station, Harpenden, Herts. 1935. Price 1s. 6d.)

Many beekeepers will be gratified that a bee-keeping matter should be the subject of a Rothamsted Conference. Modern beekeeping demands that swarming be kept strictly under control, if not entirely eliminated, otherwise the crop of honey will suffer. The apiary of the haphazard beekeeper rapidly becomes peopled with the progeny of stocks that have swarmed. It is obviously desirable to breed from strains of bees that are not inveterate swarmers, but this is not enough. Many operations and methods of management have been advocated from time to time as systems of swarm control. The best of these have survived; others have lapsed into obscurity because they are only partly effectual, because they entail too much labour when the beekeeper has little time to spare, or because they tend to diminish the honey crop to an even greater extent than the issue of swarms would have done.

This report is a symposium of practice and theory. Three systems of swarm control are described in working detail, and an attempt is made to discover the basic reasons for the behaviour of bees that are preparing to swarm, in order to learn how to anticipate the urge and turn their activities into more profitable channels. The Brood Food Theory is discussed by several of the contributors. This hypothesis is well known on the Continent, but hitherto has not received much attention in this country. Fresh attention has been drawn to it in consequence of the recent researches of Dr. G. A. Rösch in Germany, and investigations are being carried out at Rothamsted along lines suggested by his work.

Ugressfro (Weed Seeds). By Dr. Emil Korsmo. Pp. 175 and 34 Plates. (Oslo: Gyldendal Norsk Forlag. London: Williams & Norgate, Ltd. 1935. Price £2 2s.)

The contents of this finely-produced volume consist of coloured plates illustrating seeds and parts of infructescences of 306 species of European and North American weeds, accompanied by detailed descriptions in Norwegian, English and German. The approximate weight of 1,000 seeds is also given, together with the distribution of the weeds and an account of the manner in which they are distributed. Dr. Korsmo has grouped the weeds dealt with according to their "life forms." This is an unusual arrangement and one not calculated to facilitate the rapid identification of the seeds described. Readers faced with the naming of an unknown seed are unlikely to have information about the rooting system of the plant from which it came, or as to whether it was annual, winter annual, or perennial in habit. Plate XXIII which groups such diverse genera as *Hieracium*, *Cardamine*, *Alchemilla*, *Cicuta*, *Adonis* and *Chelidonium*, is a good example of this arrangement. The volume includes a valuable and novel index, which gives not only the botanical names of the species described, but also the common names used for most of them in no fewer than eleven countries. The book is well printed and should prove a worthy addition to the library of any seed-testing station, while it will be of value to all interested in the identification of seeds.

Bacteria in Relation to the Milk Supply. By C. H. Chalmers, B.Sc., N.D.A. Introd. by A. T. R. Mattick, B.Sc., Ph.D. Pp. xii + 192, and 31 Figs. (London: Edward Arnold & Co. 1935. Price 6s.)

The subtitle, "A Practical Guide for the Commercial Bacteriologist," explains the purpose of this book. The first part deals with the bacteriological control of milk: the routine examination of milk and water, taints and abnormal conditions in milk and their causes,

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isolation and identification of organisms from milk, and control of the dairy plant. The second part provides an outline of the general principles of bacteriological technique, which should render the book useful as a primer for students of agriculture and dairy husbandry in their first approach to the subject of dairy bacteriology.

Back to the Land. By C. S. Orwin and W. F. Drake. Pp. viii + 93. (London: P. S. King & Son, Ltd. 1935. Price 3s. 6d.)

This little volume, which comes from the Agricultural Economics Research Institute of Oxford, contains in a concise and readable form the facts, together with some well-informed comment, regarding the "drift from the land," the history of land settlement, and the results of a detailed inquiry in five counties into the position of statutory small holders. The last two chapters, which are devoted to the lessons of land settlement and the future of land settlement, will be read with interest by many people who, at the present time, are considering the possibility and the character of a further national effort for the provision of facilities for land settlement in Great Britain.

Geschiedkundige Schets Van West-Vlaanderens Landbouw. (*Historical Sketch of Agriculture in West Flanders*) By M. Vermeire. Pp. 640. Illus. (Bruges: Uitgave Verbeke-Loys Eigenaar Ad. Verbeke, 8 Wulfhagestraat. 1935.)

This volume is issued in commemoration of the jubilee of the Proprietors' and Farmers' Union of Bruges (Eigenaars—en Landbouwersbond van 't Arrondissement Brugge), which was founded on September 5, 1885. The first part contains a geological and pedological survey of the country, and a history of its agriculture from the earliest times to the present day. The second part deals with the progress of the Proprietors' and Farmers' Union during the fifty years of its existence, and furnishes striking evidence of the advantages of friendly co-operation between farmers and landed proprietors. Notable events in the story have been the formation of an agricultural syndicate, a co-operative trading association, a seed-sowing union, and societies for fire and horse insurance, and the establishment of a journal for the industry entitled *De West-Vlaamsche Landbouwer* (The West Flemish Agriculturist), a chemical laboratory and a grain market at Bruges. The book is copiously illustrated, and contains some interesting maps indicating the changes that have taken place in the Belgian coast-line. It merits the attention of all students of co-operative movements in agriculture.

The World's Handbook of Dairying.—By A. H. Murray. Pp. 211. Illus. (Wells, Somerset: Clare, Son & Co., Ltd. 1935. Price 5s.)

This manual, dealing with all aspects of the subject, should prove useful to those whose daily work brings them into contact with milk and its products. Compiled on similar lines to Professor McConnell's *Agricultural Notebook*, it meets a definite need, even though the author's claim that he has produced "the standard book of reference to the dairy trade" may require some qualification. On page 110 his enthusiasm for the goat leads him into inaccuracy. The fact that goat's milk is practically immune from tubercle bacilli, does not imply that the goat is "immune from disease."

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Preservation of Grass and other Fodder Crops

THE Report on the preservation of grass and other fodder crops, just issued by the Agricultural Research Council,* will be read with interest by many agriculturists. No research within the past decade in the region of crop husbandry has appealed to the agricultural mind so much as the Cambridge work on pasture herbage. Novel as it seemed, it created an immediate feeling that its economic application could not be long delayed, and already the shrewdness of this judgment is all but justified. Naturally, the first direction of applying the new ideas was towards the production of young grass for use as grown, and before long a very pliant and adaptable method of management of pasture was evolved, which has a considerable and increasing body of practitioners. The second, and necessarily later, development lies in the preservation and storage for future use of immature green grass, and it is the advance in this direction that is presented in the report now published. It is an interim statement of progress showing that commercial exploitation is very near.

Early in 1933, the Agricultural Research Council called a conference of some of those interested in the preservation of green fodders and appointed a committee under the chairmanship of Sir William Dampier to investigate and report. It has been found convenient

* A Report by a Committee on the Preservation of Grass and other Fodder Crops. A.R.C. Report Series, No. 1. Pp. 35. (London: His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C.2. 1935. Price 1s., post free 1s. 1d.)

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to pursue the subject through two sub-committees, (i) Nutrition and Management, and (ii) Process, and to combine the reports of the main committee and the two sub-committees together with two appendices, the first devoted to a description of the different forms of driers and the second to a bibliography.

The Nutrition and Management Sub-Committee deals with the present knowledge of the nutritive value of young grass and the processes of preservation. The traditional method of preservation by making hay is wasteful, and most of the loss falls on the more digestible material in the grass. The annual total loss is estimated at £5½ million. None of the older alternative ways of preservation, tower ensilage or stack, pit and trench ensilage, has made great headway in this country. Turning to new methods, the Report shows that the artificial drying of grass at the usual hay stage does not promise to be a paying proposition, but with young grass, cut short at intervals throughout the season, there is a very fair prospect of economic success. The raw material for a ton of dried grass in air-dry condition could probably be produced for about 40s., and the value of a ton of dried grass at the current prices of other feeding stuffs would be approximately £6 10s.; the margin, therefore, for the expensive process of artificial drying is sufficiently wide to be commercially attractive, although actual costings are as yet not ample enough to be reliable.

The section from the Process Sub-Committee has been written primarily from the point of view of preservation of herbage on a farm scale; production on a factory scale is considered, but only incidentally and selectively in so far as it is helpful to the farm problem. Other modern methods of preservation, such as the A.I.V. process, are not included for consideration at this stage. It is this part of the Report that contains the newest information comprising the cutting and collecting of the grass crop with ordinary farm implements and with special implements, followed by a comparison between the two; wilting the crop before carting to the drier; the physical principles of drying herbage; the general features of a herbage drier; the practical requirements of a farm drier; the cost of dried herbage; and the processing and storage of dried

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herbage. There are serious technical obstacles to be overcome in drying a wet material that is disposed to mat and is easily spoilt by burning towards the final stages, but the principles of the process will be easily understood by any reader.

Appendix I is a survey of the forms of driers, some on the market, some approaching that stage. It is clear that the committee had to content itself with description in face of incomplete data of efficiency and performance. The initial cost of plants of suitable size for farms—the mean figure is about £500—will at first sight appear prohibitive for the average English holding, but is already within possibility for the larger commercialized farms.

The League of Nations and Nutrition

It will be recalled that in September last, the Assembly of the League of Nations set on foot an international inquiry into the health and economic aspects of improved nutrition. Earl De La Warr, then Parliamentary Secretary to the Ministry of Agriculture, played a prominent part in the discussions that led up to this decision.

As a part of this inquiry an Expert Commission on Nutrition, including the most prominent European and American authorities on the subject, under the chairmanship of Professor Mellanby, Secretary of the Medical Research Council, has been set up: the first meetings were held in London, from November 25 to 30. At these meetings the Commission discussed the problem of the determination of the nutrition requirements of expectant and nursing mothers, children, and adolescents. They reviewed work in progress, and drew up a suggested list of problems for future study at the centres engaged on this type of work. Arrangements were also made for members of the Commission to keep in touch with each other through the League of Nations Health Organization.

The report of the Commission has been presented to the League Council's Joint Committee for the Study of the Problem of Nutrition, and has also been published. Copies are obtainable through Messrs. Allen and Unwin, price 6d.

Vegetable Production and Marketing

THE papers read before the Royal Society of Arts, one of the three oldest of the learned and scientific societies in England, founded in 1754, are on subjects relating to inventions, improvements and discoveries; that read by Mr. F. H. Secrett, F.L.S., on November 27, was entitled "Modern Methods of Vegetable Production and Marketing."

Good vegetables, i.e., those of the highest possible quality, were the theme of the lecture, and this was impressed upon the audience by an exhibit in the form of a stall laden with the best vegetables in season, displayed in market packs.

Having established the importance of producing high-quality vegetables, the lecturer proceeded to discuss six essential factors for their production, and his remarks were illustrated by a series of fine lantern slides, made from photographs taken at Mr. Secrett's farms.

1. *Soil and Drainage* were shown to be of fundamental importance, and a well-drained alluvial silt of a sandy nature the most desirable type.

2. *Humus* must, the lecturer considered, be present in the soil in adequate amount; the efforts to find suitable substitutes for the increasingly scarce horse and farm manure must be increased, for "artificial" he regards as occasional stimulants and not as a substitute for manure in the production of high-quality vegetables.

3. *Cultivation* must be thoroughly carried out, and the lecturer described the precise programme of cultivations carried out on his own farms.

4. *Irrigation* is a matter to which Mr. Secrett has devoted much attention and in which he has done pioneer work. The system he has adopted was described in considerable detail: a Diesel engine drives a 6-stage centrifugal pump, which sends the water through pipes to the spraying lines. Multi-nozzled and oscillating lines are used to project water as a fine mist, 20 ft. on either side of the lines. The method, devised by Mr. Secrett, of "solutionizing" the water, i.e., introducing minute but measured quantities of inorganic salts to the irrigation water was also des-

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cribed, and striking illustrations of crops that had been so treated, with controls alongside, created much interest.

5. *Glass frames* are regarded by Mr. Secrett as an essential part of the vegetable grower's equipment for the production of out-of-season crops. The systems of using French lights on hotbeds and Dutch lights on cool-beds were described and illustrated.

6. *Labour* for good vegetable production must be skilled and sufficient, and the lecturer emphasized the importance of carefully planning the programme of production.

Finally, Mr. Secrett reviewed the present state of the industry and its possible developments, particularly as regards marketing. While affirming his belief in the National Mark and the necessity for more standardization of market packages, he made an appeal for the freedom of the individual—a point which was a subject of argument in the discussion that followed.

The lecturer could not fail to appreciate the genuine congratulations he received from several men, eminent in the spheres of science and agriculture, at the conclusion of a highly successful address.

Research in Animal Parasitology

THE Report of the London School of Hygiene and Tropical Medicine for the year ended July 31, 1935,* includes an account of the researches that have been conducted at the Institute of Agricultural Parasitology, St. Albans, with the financial aid of the Ministry. As in previous years, these researches have been chiefly concerned with helminth diseases of farm stock, poultry, game, economic plants and insect pests.

Farm Stock.—The results of the past season's observations with goats under the new system of grassland management, a rotational grazing scheme, corroborate those of the past two years, showing that animals that died from natural causes were heavily infested with various species of worms. The dominant species were the smaller *Trichostrongyles* of the fourth stomach and

* London School of Hygiene and Tropical Medicine: Report by the Dean on the Work of the School for the Year ended July 31, 1935. Obtainable from The Secretary, Ross Institute, University of London, Keppel Street, Gower Street, London, W.C. 1.

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small intestine, such as *Ostertagia circumcincta*, *O. trifurcata*, *Trichostrongylus axei*, *T. colubriformis* and *T. vitrinus*. A technique has now been adopted enabling an estimate to be made of the approximate number of parasites present in each case. Last year the average number of worms was approximately 41,500 per experimental animal and 16,000 per control animal. In the "age immunity" experiment, in which goats, aged 3 years, with a light infection when put to graze on land known to be heavily contaminated by sheep and goats previously pastured on it, the results showed that there did not appear to be present any immunity to parasitic infection.

Poultry and Game.—Observations on the development of *Heterakis gallinæ* in chickens seem to show that the breed and the age of the bird have a direct effect on the development of the worms. The presence of a high percentage of minerals in the diet would appear to exercise an inhibitory effect on the infestation. In the case of *Trichostrongylus tenuis*, separate strains from the partridge and the grouse have proved infective to chickens, in which host, however, the disease has not yet run a fatal course. The presence of magnesium in the diet has resulted in a radical reduction of egg output, but has not so far affected the duration of the infestation.

Economic Plants.—The researches are concerned chiefly with nematodes belonging to the genera *Anguillulina* and *Aphelenchoides*. Of the former, the species *Anguillulina dipsaci*, the Stem Eelworm, has been known for some years as a pest of potatoes, oats and clover, and investigations are being carried out on all three crops. The results of six years' observations go to prove that with the potatoes the incidence of attack tends to decrease even when they are grown year after year on the same land. Evidence is forthcoming that certain varieties of oats exhibit resistance to attack, and this line of investigation is being pursued. Of importance is the fact that cysts of *Heterodera schachtii* have been discovered in bags of imported sugar-beet seed.

Insect Pests.—A number of identifications of helminth material, chiefly from insects, has been made, and data obtained from the dissection of *Phyllotreta*

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beetles collected during 1932-3 have been analysed, and figures showing the percentage infestation have been obtained.

Royal Agricultural College, Cirencester

A GRANT has been made from the Development Fund to meet half the estimated cost of erection of an additional wing to the Royal Agricultural College, Cirencester, to provide 20 additional bedrooms, 2 additional lecture rooms, and other accommodation. The residential accommodation at the College had already become insufficient for the numbers of students coming forward, and the recently-concluded scholarship arrangements with the two counties of Wiltshire and Gloucestershire are likely to increase still further the number of students to be received. It has been recommended by succeeding Block Grants Reassessment Committees that efforts should be made to strengthen the ties between the College and surrounding counties, and considerable headway in this direction has lately been made.

The College was incorporated by Royal Charter in 1845, and further supplemental charters were obtained in 1849 and 1870. In 1880, Queen Victoria in Council conferred on the College the title of "Royal Agricultural College." The College carried on its work in the teaching of agriculture until 1915 when, in the second year of the War, it was closed because practically all the staff and its students had left to join H.M. forces. In 1922 it was reopened and re-equipped by a grant from the Ministry and the generous contributions of old students and of the town and district of Cirencester.

The College adjoins Cirencester Park, the seat of the Earl of Bathurst, and stands on the Cotswolds about 450 feet above sea level. For practical instruction there are three farms comprising 600 acres, and the courses at the College provide for all branches of agriculture and estate management. These include Diploma courses of two years, in either Agriculture or Estate Management, and a special one-year course.

Studley College for Women, Warwickshire

THE Treasury have sanctioned a grant from the Development Fund to Studley College on the basis of providing half the cost of erecting a new wing and remodelling the existing main block of the College, together with improvements of the outside departments. The urgent need for extending facilities, both for teaching and accommodation of students and staff, has been the subject of concern for some time, as the scheme that was put forward with this object in 1931 had to be abandoned owing to the financial situation at that time.

Studley College, which originated in 1898 as a Hostel for Women at Reading, was established at Studley Castle on the western borders of Warwickshire in 1903, and five years later became known as Studley College. It developed steadily, and in 1929 the estate was purchased. The area comprises 340 acres, including woodland and water, gardens, orchards and farm. The purchase money was provided by public subscription plus a grant from the Ministry. Since that date a new poultry department has been laid out, the farm buildings have been re-planned, and additions have been made to the departments of Horticulture and Dairying. The training in each department is both practical and theoretical. Students are prepared for the National Diplomas in Horticulture, Dairying and Poultry Husbandry, and for the External degree of B.Sc. (Horticulture) of the University of London.

Agricultural Machinery Testing Committee

THE undermentioned Certificate and Report issued by the Ministry, have been published in pamphlet form :—

No. 61. The Fowler "Four-Forty" Diesel Crawler Tractor.

The test was conducted at the Institute for Research in Agricultural Engineering, University of Oxford.

Copies of the pamphlet may be obtained, price 2*d.*, post free 2½*d.* each, through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

INVESTIGATIONS ON PRODUCING QUALITY IN BEEF

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and

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IN beef, as in all other home-produced meats, good quality is essential if the British producer is to find an increasing demand on the part of consumers. Most of the scientific experiments that have hitherto been made on the breeding, feeding, and management of beef cattle have been concerned mainly with weight increases during the rearing and fattening period, rather than with the suitability of the product for the consumer. It is the purpose of this paper to outline some of the consumers' requirements, and show how experiments could be planned to test out systems of production and points of management to meet them.

A Beef Production Experiment.—One of the problems in high-quality beef production to-day is that of being able to obtain suitably bred animals, for the recent swing over to milk production has reduced the numbers of beef-bred cows available in this country. As Irish-bred Shorthorn heifers were easily obtainable, it was decided to find out if good beef cattle could be produced from these by the use of a good beef bull, and which breed of bull was most suitable for the purpose.

Some Irish Shorthorn heifers were purchased and run out on poor heavy clay grass land on the University Farm, Cambridge. They were divided into four lots, and each lot was served, during March and April, 1932, by a bull of a different beef breed—Hereford, Beef Shorthorn, Aberdeen-Angus, and Sussex being the breeds used (see Table I). It was realized that the numbers were too small to give statistically significant results in one season, but it was hoped that this preliminary trial would enable the possibilities to be explored, so that this type of experiment might be re-

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peated in subsequent years on a larger scale, or at several different centres. During the in-calf period the heifers were on grass, and were brought into boxes about a month before calving in December, 1932, and January, 1933. The birth weights of the calves, which averaged 80 lb., are given in Table I. After nearly three months in boxes the heifers and calves were run out to grass, no concentrates at all being given to them.

In August, 1933, at 30 weeks old the calves were weaned, and at this time they averaged 421 lb. The bull calves were castrated by the Burdizzo method. After weaning, the calves were all fed together in one lot in a covered yard, with space-boarding roof, on a ration consisting of silage (beans, oats and tares), meadow hay, and concentrates. At the outset the concentrates consisted of 1 lb. linseed cake, 1 lb. flaked maize, $\frac{1}{2}$ lb. bran and $\frac{1}{2}$ lb. of decorticated ground-nut cake, per head per day. After six weeks the mixture was changed, and $5\frac{1}{2}$ lb. of a mixture of 2 lb. dry beet pulp, 3 lb. maize meal and $\frac{1}{4}$ lb. decorticated ground-nut cake were substituted. Later still the mixture was gradually changed and increased again, until finally the cattle were receiving 8 lb. per head per day of the following mixture: 3 lb. dry sugar-beet pulp, 2 lb. maize meal, 1 lb. crushed barley, 1 lb. flaked maize and 1 lb. decorticated ground-nut cake. By this means they were "kept going" after weaning and never lost their baby flesh. At the end of the feeding period, some 38 weeks, when they were about 16 months old (May 5, 1934) they weighed on the average 900 lb.

In order to obtain particulars of the carcasses, and determine the suitability of these for the consumer in the large cities, the carcasses were marketed through the Ministry of Agriculture's Marketing Scheme for livestock, at the Birmingham City Meat Market. They were weighed and graded by the Ministry's graders, and in addition, for the purposes of the experiment, observations were taken on special carcass points. The average live weight at Birmingham just before slaughter was 865 lb., and the average dead weight 527 lb., giving $68\frac{1}{2}$ lb. of beef per live cwt.—or an average carcass percentage of 61 per cent. of the live weight before slaughter. All carcasses were graded "select" except two, these being graded

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TABLE. I.—DETAILS OF ANIMALS BRED FROM IRISH SHORTHORN HEIFERS BY BULLS OF DIFFERENT BEEF BREEDS.

Breed of sire	No	Sex	Date of birth	Weight at birth lb.	Weight at 30 weeks (weaning) lb.	Live weight		Dead weight lb.	Carcass %	Grade	Price realized		
						On farm (5/5/34) lb.	Birmingham (25/5/34) lb.				d. per lb.	per beast	per livewgt.
Hereford	4	H	21/12/32	82	483	948	914	568	62.1	S	8	18 18 8	45 10 1
	7	H	23/12/32	88	427	878	821	511	62.2	S	8	17 0 8	46 11 1
	11	B	1/1/33	72	418	994	947	589	62.2	S/S	8 1	20 4 11	47 7 1
	17	B	21/1/33	80	381	881	828	516	62.2	S	8	17 4 0	45 10 1
Beef Shorthorn	2	B	15/12/32	72	388	801	780	474	60.1	S	8	15 16 0	45 1 1
	3	H	18/12/32	71	447	868	832	527	64.3	S/S	8 1	18 2 4	48 3 1
	6	H	22/12/32	86	393	884	896	557	62.2	S	8	18 11 4	46 5
	14	B	6/1/33	95	458	949	920	572	62.2	S	8	19 1 4	46 2 1
Aberdeen Angus	16	H	14/1/33	70	412	847	816	500	61.3	S	8	16 13 4	45 11 1
	1	B	11/12/32	81	446	896	876	531	60.6	S	8	17 14 0	45 8
	10	H	25/12/32	73	422	940	893	532	59.9	S	8	17 14 8	44 4
	12	B	3/1/33	78	453	973	936	543	58.0	S	8	18 2 0	43 10 1
Sussex	15	B	13/1/33	89	438	958	932	544	58.4	S	8	18 2 8	43 11 1
	18	H	26/1/33	76	296	766	738	425	57.6	S	8	14 3 4	43 7
	9	H	24/12/32	91	453	917	840	516	61.4	S	8	17 4 0	45 10 1
	4	—	—	80	427	925	878	546	62.2	—	—	18 4 7	—
Av. Hereford	5	—	—	79	420	870	849	526	62.0	—	—	17 12 10	—
Av. Beef Shorthorn	5	—	—	79	411	907	875	515	58.9	—	—	17 3 4	—
Av. Aberdeen Angus	1	—	—	91	453	917	840	516	61.4	—	—	17 4 0	—
Av. Sussex	15	—	—	80	421	900	865	527	61.0	—	—	17 12 11	—

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“super-select.” The details of each animal and the prices realized are shown in Table I.

For experimental purposes this system of marketing was found to be most useful, for full particulars of the weights, etc., were available and carcass experts were there to give their opinion on the various points of quality that were being investigated.

Quality Points.—Quality in beef is that which members of the public like, and the butchers can sell, best. Many different factors are concerned, some of the most important being as follows:—

Carcass Percentage.—Since cattle with large head, legs and other offals are generally poor in other respects, a low carcass percentage is usually associated with an undesirable type of carcass from the butcher's point of view. The carcass percentage is therefore higher in cattle of the blocky type than in coarse long-legged animals. An increase in carcass percentage also occurs with age because the carcass as a whole matures later than the offal parts. During the process of growth and fattening there is a large increase in carcass percentage because most of the weight added goes on to the carcass rather than to the offal. With the usual type of 2½-year-old Shorthorn steer the average carcass percentages would be approximately as follows:—Store, 50-51 per cent.; fresh store, 52-53 per cent.; moderately fat, 54-57 per cent.; fat, 58-62 per cent.; and very fat, 63-65 per cent. Naturally the carcass percentage will vary greatly with the “fill” of the animal, that is, whether it is killed directly after feeding or after a period of travel by rail, or fasting. It may be noted here that under the present Cattle Subsidy regulations it is an advantage to the owner of well finished cattle, giving a good carcass percentage, to market them on a dead-weight rather than on a live-weight basis.

Carcass Weight.—In these days there is a demand for small joints; owing to this, and to the fact that larger carcasses are usually coarser in the grain (see below), the price per stone given for the carcass in the large cities falls rapidly with increase in weight of the carcass over about 500 lb., i.e., a bullock weighing alive about 8 cwt. Changes in this direction have been taking place rapidly in recent years, for, as the follow-

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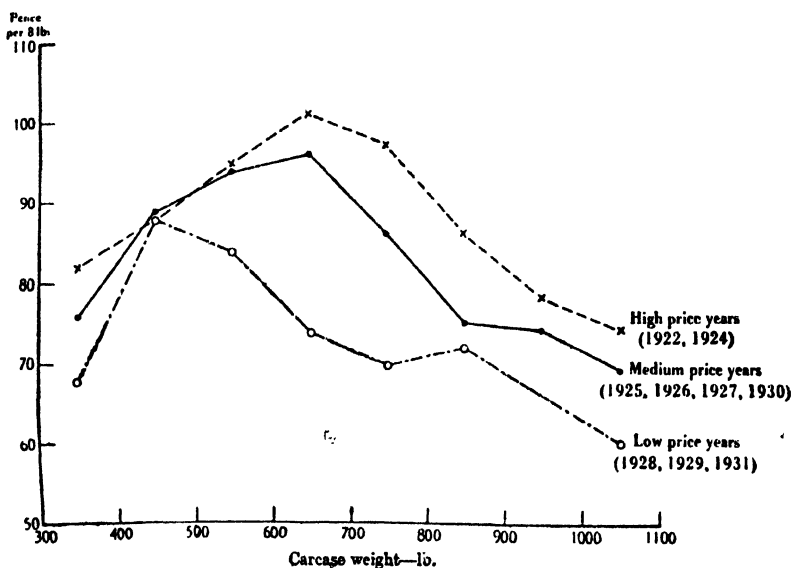


FIG. 1. The prices given for beef carcasses of different weights at the auction sales at Smithfield Show (prizewinners excluded) in years of different price levels.

(From Hammond and Murray. *Jour Agric Sci*, 1934. 24, 233.)

By permission.

ing chart of prices at the Smithfield Show auctions of carcasses (Fig. 1) shows, only 10 years ago the weight at which prices began to fall on the average was 650 lb., i.e., a bullock weighing about 10 cwt. As with other changes in public taste, the country districts and provincial markets frequently lag behind London in this respect.

We would suggest that, in order to encourage the small well-finished bullock, the subsidy should be higher for animals weighing under 9 cwt. alive than for those weighing over this amount, or on a sliding scale according to weight and quality.

Proportions of the Carcass.—The valuable parts of the carcass lie in the hindquarters and along the back; these are the roasting joints, which the butcher can sell at a profit because there is a good demand for them. The other parts, such as the neck, shanks, brisket and lower parts of the ribs are boiling and stewing joints, for which there is a poor demand, and the butcher often has to sell them below cost price in order to clear them (see Fig. 2).

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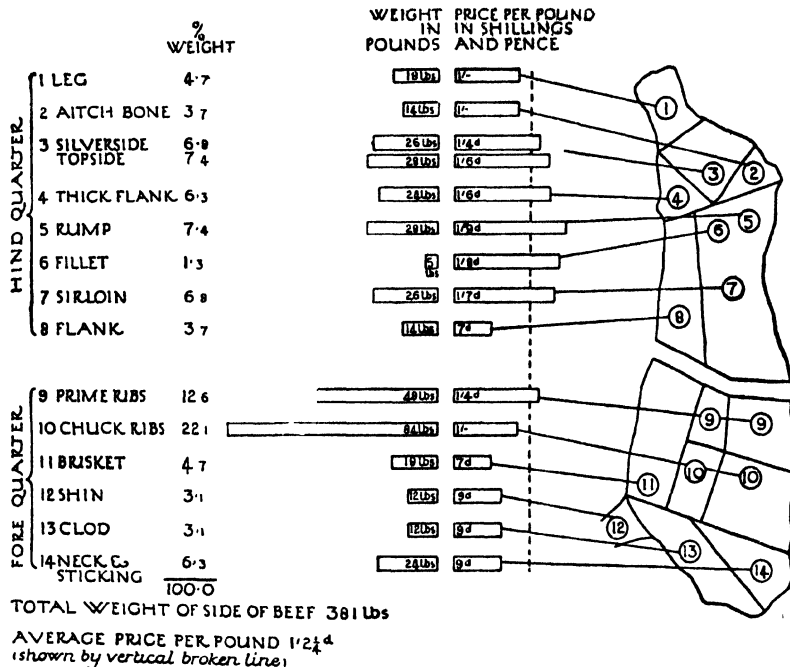


FIG. 2. Comparative weights and prices of the different cuts in a beef carcass.
(From Short: *The Butcher's Shop*. Oxford, Economics Research Institute, 1928.)
By permission.

The proportions of the body change as the animal grows up. In early life (Fig. 3, No. 1) the head and legs are proportionately large and there is a high percentage of bone in the carcass; an animal badly bred for beef, or kept on a low plane of nutrition (Fig. 3, No. 12) never gets much beyond this stage, and so is always of poor quality. As the animal grows up (Fig. 3, Nos. 2, 3 & 4), the body first lengthens and then deepens, while the proportions of muscle and fat increase and bone decreases. The best state of development at which to kill is when the body has just begun to deepen (as in the steer of 11 months, Fig. 3, No. 13) and before the depth of rib has developed too far, for this depth adds to the proportion of low-priced joints and "wastefulness" of the carcass (as in the steer of 22 months, Fig. 3, No. 14).

The young beefling, as will be seen from Fig. 3, gives a higher proportion of roasting joints (81 per cent. of the side) and is therefore more valuable to the

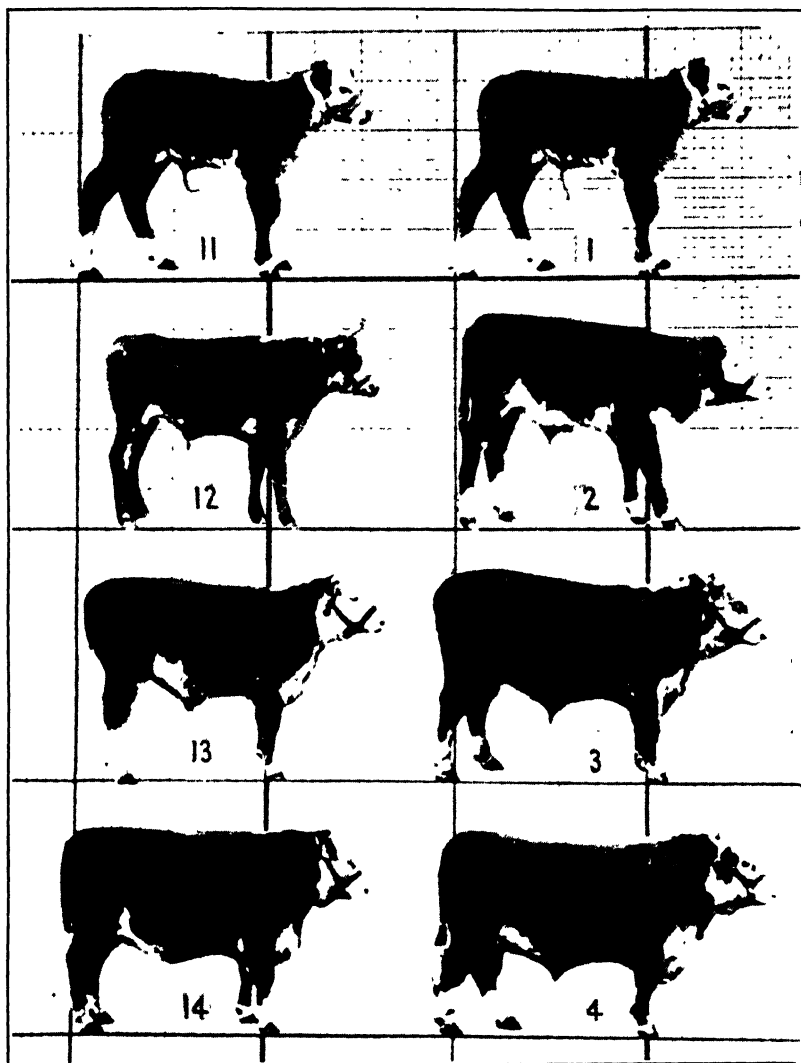


FIG. 3. Changes in the proportions of Hereford Cattle. In order to show changes in proportions, as distinct from size, all the photographs are reduced to the same height at the shoulders.

On the left

The proportions in steers of different ages and levels of feeding. (12) 30 months grown on low level of nutrition. (13) 11 months grown on high level of nutrition.

On the right

The changes in the proportions of bulls as they grow up. (1) 2 days. (2) 5 weeks. (3) 13 months. (4) 22 months.

(From Hammond. *Hereford Breed Annual*, 6, 1928.)

By permission

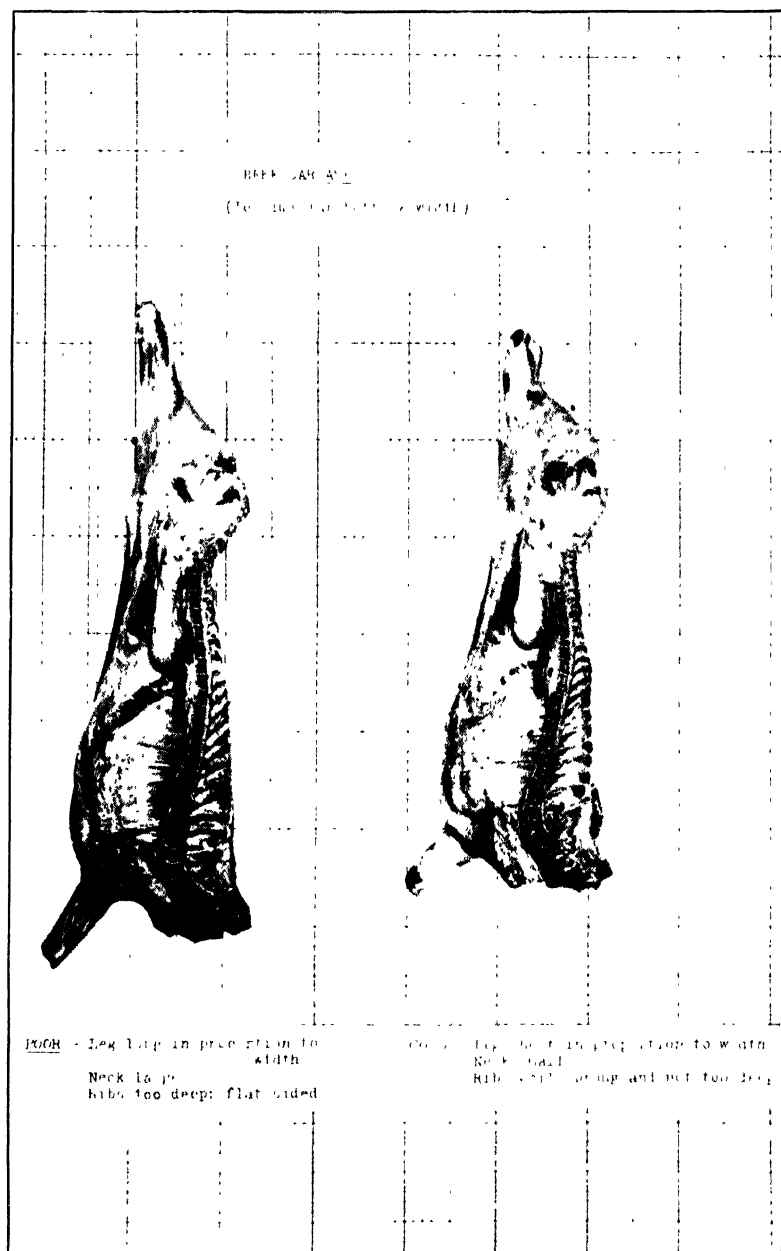


FIG. 4 - Examples of *(left)* undesirable and *(right)* desirable beef carcasses
Compare with the prices for different cuts in Fig. 2



FIG. 6.—Magnified 100 $\times$ thin cross section of the eye muscle at the last rib, showing the "grain" (or muscle bundles) which determine the coarseness of the eating qualities.

- (a) *Left*—From a veal calf of 5 weeks old—fine grain.
 (b) *Right*—From a steer of 2½ years old—coarse grain.

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butcher than the more mature animal (53 per cent. of the side roasting joints).

Typically good and poorly-proportioned carcasses are shown in Fig. 4. On the left the poor carcass has a high proportion of neck, brisket and rib, while the length of the shank is long in proportion to the depth of meat. This is well seen in a cut through the carcass at the last rib (see Fig. 5) where the thickness of the "eye muscle" in proportion to the bone is poor as compared with that of the other carcass.

"*Grain.*"—The lean meat or muscle is made up, as can be seen through the microscope, of small muscle fibres grouped together into bundles. The size of these bundles determines the coarseness of the "grain" of meat, which is closely associated with toughness and stringyness. In small and in young animals the size of the muscle fibres and bundles is small, and so the meat is fine-grained and tender, whereas when the animal grows up the grain becomes coarser (see Fig. 6).

A rough test for the "grain" is to stroke the surface of the cut muscle with the thumb, a smooth velvety feel denoting a fine grain. The public is now paying much more attention to the softness of eating than to flavour. Owing to the greater tenderness of the beefling a greater part of the carcass can be sold for roasting (see above), in much the same way that the secondary cuts in veal are sold for this purpose instead of going as stewing joints.

"*Finish.*"—In the first stages of fattening, fat is put on in the caul and around the kidney. An animal badly bred for beef, such as a Jersey cow, never gets much beyond this stage, however much it is fattened. In the next stage the fat is put on over the surface of the carcass, giving the animal the smooth outline associated with a well-finished beast. This fat not only prevents the muscles drying up on hanging, which is necessary to develop tenderness, but also prevents drying up during the cooking of the joint. In the final stages of fattening the fat is deposited between the muscle fibres within the muscle (marbling fat). On the wholesale market this stage is judged by the amount of the fat deposits on the inside of the ribs. This marbling fat is very important in beef, especially

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in the larger and older carcasses, for it assists in breaking up the coarseness of the "grain" (see above) which is one of the faults of these carcasses. It is essential therefore that the larger and older carcasses should be well finished.

Colour of the Fat.—A pale primrose-yellow fat is liked rather than a deep yellow fat. This is not due to differences in nutritive value or flavour, but is because the colour is not liked by consumers. Dairy breeds such as the Jersey and Guernsey have deeper yellow fat than the beef breeds. The colour is produced from the green colouring matter of plants, and becomes deeper and more concentrated as the fat gained on such feeds is lost during a period when the animal goes back in condition. The colour is thus deeper in old cattle, such as cows, than in young quickly-grown beef, and is deeper in animals that have made most of their fat from grass than in those that have been given concentrates and roots.

Colour of the Flesh.—This factor is important, as it is related to the flavour of the meat. Dark meats, such as game or the leg of a chicken, are more highly-flavoured than light meats, such as the breast of a chicken. With beef there is an optimum colour—a bright light red; the pale flesh of veal is comparatively flavourless while the dark flesh of old bulls is too strong in flavour to suit public taste. Absence of iron from the food, such as in milk feeding, prevents the formation of the red colour in meat, while much exercise and non-castration increase it. For experimental purposes colour scales are in use for measuring it, but the measurement should be made at a constant time after cutting the side, because changes occur in the surface colour when meat is exposed to air and drying.

Conclusions.—The experimental animals all came out well as regards these quality points, as the final grades show (see Table I). All the beef breeds used gave good carcasses, and such differences as existed between them could only be differentiated with any degree of certainty by tests with larger numbers of animals. From observation of individual animals, however, one obtained the impression that with strong-framed heifers the Aberdeen-Angus bull did best,

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whereas with light-framed heifers of the dairy type, the Hereford and Beef Shorthorn were superior. Further tests, however, are required on this and many other problems of beef production.

As the methods of producing beef vary greatly in different parts of the country, we would suggest that the Agricultural Colleges and Farm Institutes throughout the country should co-operate to carry out a series of experiments on the methods of producing beef of good quality, using the Ministry's Marketing Scheme at one centre as a means of co-ordinating the tests for quality.

THE VILLAGE HALL FUNDS

*(Contributed by the National Council of
Social Service)*

MANY people have remarked on the number of village halls built during the past twenty years, but it is not generally known that the movement for the provision of halls has received considerable stimulus from the provision of public and other funds for that purpose.

In 1925, the Development Commission decided to provide a Village Halls Loan Fund of £5,000, from which loans, *free of interest*, could be made towards the cost of approved village hall schemes. Shortly afterwards the Fund was increased to £25,000, but it was reduced to £20,000 at the time of the financial stringency in 1931. In 1930, the Carnegie United Kingdom Trustees, impressed by the success of the Loan Fund in stimulating the provision of village halls, decided, as part of their rural development policy, to supplement the loans with small grants. Up to the date of this article the Trustees have allocated £66,000 to their Village Halls Grant Fund. The Trustees have further shown their keen interest in the village halls movement by providing an additional £20,000 as a reserve Loan Fund, thus bringing the capital sum available for loans up to £40,000.

The day-to-day administration of the Grant and Loan Funds has been entrusted to The National Council of Social Service (26, Bedford Square, W.C. 1), from whose Secretary detailed information on any of the matters dealt with in this article may be obtained. The National Council have appointed a special Sub-Committee to examine applications, approve loans and recommend grants to the Carnegie Trustees. Mr. A. T. A. Dobson, C.V.O., C.B.E., of the Ministry of Agriculture and Fisheries, is the Chairman, and the other members are Mr. W. Harding-Thompson, M.C., F.R.I.B.A., Miss E. Walker (National Federation of Women's Institutes), Mr. J. M. Ramsay, O.B.E. (Department of Agriculture for Scotland), Major Granville Streatfeild,

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O.B.E., D.S.O., F.R.I.B.A., Mr. W. W. Zambra (National Playing Fields Association), and Mr. Humphrey Baker, M.A., Barrister-at-Law (Commons, Open Spaces and Footpaths Preservation Society). This Committee has the assistance, in twenty-two counties (two in Scotland), of Rural Community Councils, who advise village hall committees on their applications and conduct the preliminary negotiations. In other counties, both in England and Scotland, negotiations are carried out with the village either direct from the London office of the National Council, or in Wales from the National Council's Welsh Department at Cardiff. Villages in Northern Ireland have the help of the Rural Development Council of Northern Ireland in preparing their applications.

Where it is proposed to build a new hall, or to acquire an existing building, such as a barn or disused chapel, for adaptation as a hall, the assistance offered from the Funds is on a generous scale. A grant of one-sixth of the cost of a scheme, and a loan of one-third of the cost, *free of interest*, may be obtained, on condition that the remaining half is raised by the village. For example, if a hall is to cost £600, the free grant is £100, and the loan may be £200, but the village must raise £300. The village must also repay the loan in five equal yearly instalments, i.e., £40 a year when the loan is £200.

Grants are not available where it is proposed to improve an existing hall, but loans of half the cost, *free of interest*, may be had for this purpose on condition that the other half is raised by the village. The schemes of structural improvement eligible for loans are, for example, the provision of extra rooms, enlargement of the main hall, improvement of the stage or green rooms, the provision of new emergency exits or other alterations to the building required by the licensing authorities, the provision of heating, lighting or sanitary arrangements, and so on. Many village halls can take on a new lease of life and serve a variety of new purposes if improvements of this kind are carried out.

Nearly 320 villages have already taken advantage of one or other of the facilities offered by the Funds. On March 31, 1935, the Carnegie Trustees had

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approved 269 grants amounting to £37,603, and 248 loans amounting to £50,764 had been made. One of the most satisfactory features of the whole scheme has been the readiness of the villages to repay the loans. Despite the hard times through which agriculture has been passing, there has not been a single pennyworth of bad debts. A few villages have asked for an extra month or two in which to repay instalments of loan, but the majority have paid their instalments on the due dates, and, during the six months ending September 30 last, villages actually paid back a sum of £1,353 before it was due. Grants and loans have been fairly evenly distributed. Occasionally, however, there is special activity in a particular area, probably owing to the news spreading from village to village. Thus nine hall schemes have been helped in the Shetland Islands as opposed to none in the Orkney group. The average population of the 320 villages helped is 627 and the average cost of the new halls built is £820.

The facility with which the grants and loans are taken up might suggest that the conditions on which they are awarded are very easily satisfied. It is true that the conditions have been kept as few and as simple as possible, but the Village Halls Sub-Committee of the National Council have very rightly insisted that on two fundamental points the schemes helped must satisfy a high standard. These two conditions relate to (a) the plans for the building, and (b) the trust deed under which the hall is to be held.

It was considered that a disservice would be done to the countryside if villages were encouraged to build ugly, badly-designed or temporary halls. At the same time there was a danger that by requiring too high a standard of construction, the smaller and poorer villages might be deprived of the help of the Funds. Further, the local architect often has an extremely difficult problem. He must, with severely limited funds, provide a building pleasing in appearance and in harmony with the surrounding farms and cottages. He is also very often required to design the internal lay-out of the hall in accordance with instructions formulated at a public meeting of the village, and in such a way that the various needs of the village as a community may be satisfied. The hall may be used for



THE OWEN GLYNDWR MEMORIAL INSTITUTE, GLYNDWRDWA, MERIONETHSHIRE

This hall is built of local stone with dark blue slate roof, and cost approximately £1,750. When this photograph was taken the hall was barely finished and the surrounding garden not even begun, yet the building already has the appearance of being a natural part of the landscape.



STOWLING PLACE ROOM, KENT

The foundation and upper walls of concrete of this hall were built by the dwellers in the village and their friends on Saturday afternoons and in their spare time, without payment. The roof timbering was bought, ready cut and fitted, and the thatching was carried out by a professional thatcher whose work was paid for. The hall cost £327.



DUDDINGTON VILLAGE HALL, RUTLAND

Built of brick faced with stone and roofed with local Collyweston grey slates, this hall cost about £1,685. Note the close harmony which exists between the new hall and the old church and cottages on the right of the picture.



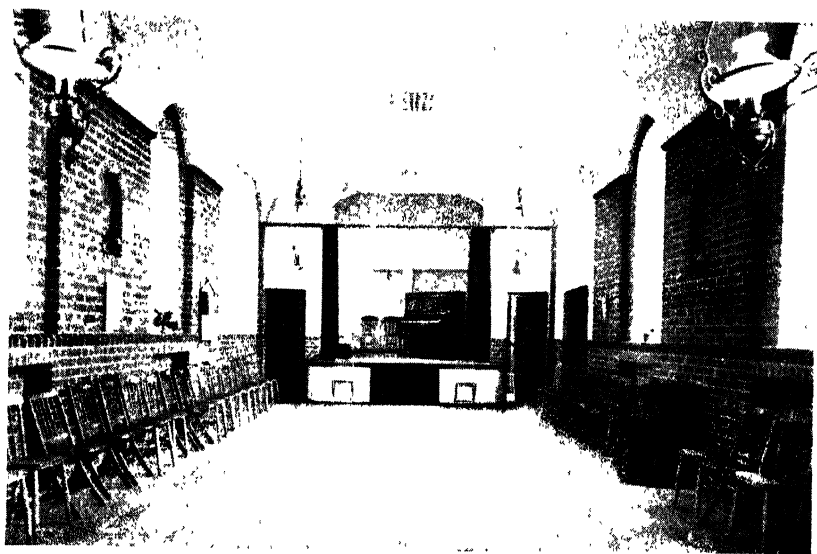
YAFFENDON VILLAGE HALL, BERKSHIRE

This hall was built of elm weatherboarding on concrete foundations with a roof covering of old hand-made tiles. The strong wooden fence is designed to be in keeping with the hall itself. The cost was approximately £1,275.



KINGSTON BARN, NEAR CANTERBURY, KENT

This fine old barn has been carefully repaired and converted to form an excellent village hall. Large, well-proportioned windows have been inserted in the walls, the interior was colour-washed and a good floor has been put down.



UPPER DICKER VILLAGE HALL, EAST SUSSEX

This shows a well-lighted interior in brick and white plaster. There is storage space under the stage and the lamps are hung at the sides so as not to obstruct the view of the stage. This hall cost approximately £1,200 to build. The seating capacity is about 150.

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dances, whist drives, cinema shows, concerts, dramatic performances, badminton, physical training, library, lectures, parish council offices, wedding receptions, carpentry, flower shows and so on. It must be capable of being easily and rapidly adapted for any of these uses and of satisfying the licensing regulations appropriate to each occasion. In the face of these difficulties many mistakes are made, and it may become a serious question whether a scheme can be helped when, for example, it is so designed that it cannot satisfy the normal requirements of the public entertainments licensing regulations. Fortunately, the National Council have had the help of a voluntary panel of architects, nominated by the R.I.B.A., to whom the plans and specifications of every scheme have been sent, and who, by sympathetic and skilful suggestions, have enabled many villages very considerably to improve their plans at small extra cost, or on occasion so as to effect actual saving. On the whole, the standard of design and lay-out has steadily improved from year to year. This is partly due to an improvement in public taste, but largely also to the work of the panel and to the issue of a shilling booklet (*Village Halls, Their Construction and Management*) that embodies the panel's recommendations. This booklet has already reached its third edition and is in constant demand.

Of equal importance with the plans is the trust deed, or, in Scotland, the trust disposition. This document not only provides for the ownership of the hall, but lays down what the hall is to be used for and how it is to be managed. Because deeds are couched in legal terms, and their implications are not properly understood, villages often permit the drawing up and execution of a deed that is far from carrying out the wishes of the community, and that may even prove unworkable in the ordinary course of village life. During the past ten years the National Council of Social Service has been consulted by a very large number of villages whose deeds for village halls have proved unsatisfactory, and who have to be told that the only course open to them is to persuade the Charity Commissioners to make an Order varying the Trusts—a lengthy, though not necessarily an expensive, business. For these reasons, the conditions of the Funds require that the draft trust

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deed should be submitted for approval before it is signed and sealed, and that it should provide (a) for the freehold of the hall to be vested in trustees for the benefit of the villages, and (b) for the hall to be managed by a committee on which each of the village organizations must be represented. By associating the Parish Council, Churches, Women's Institute, Men's Club, Scouts, Guides and other similar organizations in the management of the hall, it is made certain that no individual or sectional interest will secure a monopoly of the use of the building.

If the plans and deed are satisfactory, the village may expect to have its application approved. The grant and loan will then be paid when the local quota has been found. In an increasing number of instances the smaller and poorer villages provide part of their quota in the form of voluntary labour given by those who cannot afford to give cash, but who can help to dig foundations or lay bricks. The following are some of the villages that have built their halls almost entirely by voluntary labour:—Derrington (Staffs.), Urchfont (Wilts.), Little Mill (Monmouthshire), Sutton-on-Derwent (Yorkshire), Mynydd Llandegai (Caernarvonshire), and Stowting (Kent).

It is not possible in a short article of this kind to deal with the use and management of the halls after they are built, but an account of the Village Hall Funds would not be complete without any reference to the purposes that the halls are meant to serve. It may be expected that dances for the young people and whist drives for the older ones will figure prominently in a village hall committee's winter programme, but those are only the beginnings of usefulness of a well-run and well-equipped hall. It can, in fact, become the focusing point of services provided or aided by the State, such as adult education classes and courses, parish council meetings, maternity clinics, and the school dental service. It can be made the home of all young people's activities, such as the Young Farmers' Club, Scouts, Guides, Boys Clubs, Girls Friendly Society, and the like. It may be the headquarters of the other village organizations, such as the Farmers' Union, the Women's Institute, the British Legion and so on. It may be the village theatre, concert hall

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and cinema all in one. Whether or not the halls are actually put to use in these ways depends first of all on the villages themselves realizing the possibilities and being prepared to co-operate wholeheartedly in organizing the various activities. It will also depend to a large extent on the extension of the Rural Community Councils, at present working in twenty-two counties, to other areas. These Councils act as the headquarters of village hall committees in their counties. They advise the local committees on their problems, keep them fed with new ideas, and serve as a link between the county statutory and voluntary organizations and the villages. Anyone who has visited a large number of hall committees in counties where there is no organization of this kind, and in counties where it exists, is bound to be struck by the greater variety of activities and greater sense of responsibility in the latter. They feel themselves to be, and are in fact, part of a national movement to promote the happiness and well being of the countryside.

Meanwhile, in counties where Rural Community Councils have not yet been formed, the National Council of Social Service acts as an informal headquarters for village hall committees. The National Council is consulted daily on problems of management and finance, and is asked to suggest activities. A quarterly leaflet (*The Village*) is issued, containing short notes on such matters as village drama or music, copyright charges, licences for plays, rates, income tax, and accounts of especially interesting village hall events. Further, a national village hall licence has been negotiated with the Performing Right Society, under which halls may be registered for less than the usual fees for performing copyright music. In these and other ways the National Council helps village committees to get the best results out of their halls, and to meet the daily problems that confront them.

DRIED SUGAR-BEET PULP FOR BACON PIGS

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For the past few years dried sugar-beet pulp has been a cheap source of carbohydrate, and has been largely used in the feeding of cattle and sheep. Its use for pig feeding has not, however, been so widely adopted. The value of dried beet pulp for pigs was first investigated in this country by Woodman¹ in 1928, who, after carrying out digestion trials, came to the conclusion that the pulp was as readily digested by pigs as by bullocks, sheep and dairy cows. Owing to its bulky nature when mixed with other foods, and especially after soaking in water, it could not be regarded as an entirely suitable source of carbohydrate for pigs intended to reach bacon weight as quickly as possible. In 1929 Crowther^{2*} carried out a feeding trial with pigs being fattened to bacon weights, replacing 20 per cent. of weatings in the ration by 20 per cent. of dried beet pulp. Feeding this amount, and with slight adjustment of the amount of extracted soya bean meal to give roughly the same proportion of protein, the live weight increase and the food consumption per lb. of live weight increase were the same whether pulp was included in the ration or not.

To provide further information on the effect of feeding dried beet pulp to bacon pigs, feeding trials were carried out in Norfolk in 1933 and 1934 on the following farms, with the kind co-operation of the farmers concerned: R. H. Kerkham, Esq., Terrington St. Clement; Messrs. Henry Overman & Co., Weasenham St. Peter; Wissington Beet Sugar Factory Farm; Norfolk Agricultural Station, Sprowston. The trials were carried out with the financial assistance of the Ministry of Agriculture and Beet Sugar Factories Joint Committee on Sugar-Beet Research and Education.

Details of Trials.—In all there were six feeding trials, the pigs in each trial being fattened to bacon

* For references, see p. 998.

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weight under ordinary farming conditions. Weasenham was the only farm where dry feeding was practised; in the other trials the meal was soaked for some hours before feeding. The two groups of pigs in each trial were selected on weight, equal numbers of the same sex and from the same litter being allocated to each group. The details of the number of pigs, their age and weight are given in Table I.

TABLE I

		<i>No. of pigs in each group</i>	<i>At start of Trial Av. age (weeks)</i>	<i>Av. wt. (lb.)</i>	<i>Period of Trial (weeks)</i>
1933.	Sprowston ..	8	14	70	16½ (May-Sept.)
	Terrington ..	8	9	35	23 (June-Nov.)
	Weasenham ..	6	11	62	12 (May-Aug.)
1934.	Sprowston ..	7	17	136	6 (July-Aug.)
	Weasenham ..	6	11	54	16 (Aug.-Nov.)
	Wissington ..	6	13	58	16 (May-Aug.)

It will be seen that the age of the pigs at the start of the trials varied from 9 to 17 weeks, the length of trial varying from 6 weeks up to 23 weeks. All the trials were begun during the summer months.

The proportion of pulp fed was as follows, the plain form of pulp being used except at Wissington where dried molassed pulp was fed :

1933.	Sprowston	20%	weatings replaced by	20%	beet pulp.
	Terrington	25%	" "	25%	" "
	Weasenham	25%	" "	25%	" "
1934.	Sprowston	19%	" "	19%	" "
	Weasenham	10%	barley meal	"	"
		10%	flaked maize	"	"
	Wissington	20%	barley meal	"	"

In four of the trials, beet pulp was substituted for weatings; in the other two trials, barley meal, or barley meal and flaked maize were replaced, these two foods at the time being dearer than weatings. Some weatings and barley meal were included in all the rations, and both groups received the same amount of protein supplement, consisting of 10 per cent. fish meal, or 12 per cent. extracted soya bean meal, plus 2 per cent. of a mineral mixture composed of 1 part by weight of salt and 4 parts of feeding chalk.

Live-Weight Gains.—The pigs were weighed individually at the start of the trial, at periodical intervals during the trial (mostly every 14 days), and finally when the trial was completed. The daily live-weight gains

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per pig in lb. over the whole period of each trial are set out in Table II.

TABLE II

		<i>With pulp</i>	<i>Without pulp</i>	<i>Difference</i>	<i>Standard Error</i>
1933.	Sprowston	1.18	1.36	0.18	0.04
	Terrington	0.89	1.03	0.14	0.04
	Weasenham	1.36	1.43	0.07	0.025
1934.	Sprowston	1.84	1.79	0.05	0.12
	Weasenham	1.54	1.52	0.02	0.03
	Wissington	1.40	1.41	0.01	0.04

All the pigs made satisfactory live-weight gains. At four of the centres the pigs not receiving pulp made the higher live-weight gains, but in only two trials (Sprowston 1933 and Terrington 1933) were the differences statistically significant. At the other four centres the differences in live-weight gains were too small to reach significance. In the 1933 trial at Sprowston some difficulty was experienced in getting the pigs to consume the pulp satisfactorily. For some weeks practically all the pulp was rejected by the pigs, and it is reasonably certain that this affected their live-weight gains. A similar difficulty was experienced in the Terrington trial in the same year, and again there was a significant difference in the live-weight gains. At this centre moreover, the pigs were only 9 weeks old when the trial began. It would appear, therefore, that beet pulp is not so suitable a food for young pigs as for older pigs, especially when there is as much as 25 per cent. pulp in the ration, as at Terrington. With older pigs there is not the same difficulty in feeding beet pulp to the extent of one-fifth or one-fourth of the total ration, once the animals have become accustomed to the food. This is indicated by the results at the four centres where the pigs consumed the pulp satisfactorily, and where there were no differences in the live-weight gains.

Grading.—Thirty-two of the pigs were sent to the bacon factory under contract and the grading results are given in Table III.

Owing to the small number of pigs graded, no conclusive evidence can be drawn as to the influence of pulp feeding on grading, but it is noteworthy that, when pulp was fed, 12 out of the 16 pigs were grade

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TABLE III

Grade	Number of Pigs				Payment	
	Shoulder Pulp	Grade No pulp	Belly Pulp	Grade No pulp	Pulp	Grade No pulp
A	2	1	6	8	1	—
B	—	—	—	—	4	5
C	9	8	10	8	7	4
D	5	7	—	—	4	7
Total	16	16	16	16	16	16

C or over; when pulp was omitted from the ration, only 9 out of the 16 pigs graded C or over. It should not be deduced from this, however, that beet pulp feeding will always improve the grading. If the pigs put on weight less readily when fed beet pulp, then it is possible that better grading will follow as a result of the slightly slower rate of fattening. Otherwise, there seems no reason why the inclusion of beet pulp in the ration should have any effect on the grading of the pigs.

Meal Consumption.—The amount of meal consumed by each pen of pigs was measured, and in Table IV. the weight of meal consumed for each lb. of live-weight increase is given for each centre :—

TABLE IV

		With Pulp		Without Pulp	
		lb.		lb.	
1933.	Sprowston ..	..	4·0	..	4·0
	Terrington ..	..	4·8	..	4·2
	Weasenham ..	..	3·3	..	3·1
1934.	Sprowston ..	..	3·4	..	4·1
	Weasenham ..	..	3·0	..	3·0
	Wissington ..	..	5·0	..	5·0

The only marked differences were at Terrington in 1933 and at Sprowston in 1934. The Terrington trial has been discussed above. The pigs in the 1934 Sprowston trial were 17 weeks old at the start; they ate the pulp readily and were content with a smaller amount of meal than the control pigs. Unfortunately, owing to the impossibility of ascertaining the amount of meal consumed by each individual pig, no inferences can be made regarding the amount of meal consumed by pigs at different ages when fed on pulp, but the results at these two centres suggest that pulp feeding is more economical (as regards the conversion of meal into meat) with older pigs than with younger pigs.

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Over the average of the six trials, the amount of meal consumed per lb. of live-weight increase was 3.92 lb. when pulp was included in the ration and 3.90 lb. when pulp was omitted from the ration. If the Ter-rington trial is excluded, the figures become 3.71 lb. and 3.85 lb. respectively. In both cases the differences are too small to be of practical significance.

Cost of Feeding.—It may be concluded from these trials that up to 20 per cent. of dried beet pulp (either plain or molassed) may be included in the ration of fattening pigs, providing that smaller quantities of pulp are fed during the early stages. There is a risk, however, that the pigs may find the pulp unpalatable at first and not put on weight so readily in consequence. Much will depend upon the skill of the feeder. It may be necessary to try such expedients as soaking the pulp overnight, and then mixing in the dry meal, which adheres to the pulp particles, or mixing the dry pulp into the soaked meal just before feeding. Both these methods were adopted with success in the trials—the first method at Weasenham, where the pigs were fed dry, and the second at Sprowston where wet feeding was practised. The inclusion of beet pulp in the rations of bacon pigs seems justified, therefore, only when it can be purchased at a distinctly cheaper cost per unit of starch equivalent than one or more of the other carbohydrate constituents of the ration.

Beet pulp has a certain lightening effect on the ration, and in this respect it is comparable to weatings, for which it may be substituted. As the following analysis shows, the starch equivalent of these two foods is approximately the same, but the pulp contains a lower proportion of protein, and a higher proportion of fibre.

		<i>Starch</i> <i>Equivalent</i>		<i>Digestible</i> <i>Protein</i> <i>per cent.</i>		<i>Fibre</i> <i>per cent.</i>
Dried beet pulp	..	65	..	5.0	..	18.3
Weatings	.. ..	64	..	13.0	..	5.75

With the exception of the protein supplements, weatings are usually the most expensive constituent in the ration, and in the following table the saving in the cost of food has been calculated when 20 per cent. of weatings is replaced by 20 per cent. of dried pulp. It is assumed that the substitution would be effected when

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the pigs are 14 weeks old, and that the pigs would reach bacon weight at (a) 26 weeks or (b) 30 weeks. It is also assumed that over the period of 12 or 16 weeks the average amount of meal consumed by each pig would be 5 lb. daily.

TABLE V

<i>Difference in cost per ton between pulp and weatings</i>			<i>Saving per pig by including 20 per cent. of pulp in the ration</i>		
			<i>(a) at 26 weeks</i>		<i>(b) at 30 weeks</i>
£	s.	d.		s. d.	s. d.
3	0	0	..	2 3	3 0
2	0	0	..	1 6	2 0
1	0	0	..	0 9	1 0
0	10	0	..	0 4½	0 6
0	5	0	..	0 2½	0 3

It will be seen that when weatings are £2-£3 per ton dearer than beet pulp, a considerable saving can be effected by the inclusion of some beet pulp in the ration. When there is a difference of £1 or less per ton in the cost of these foods, however, it is doubtful if there would be any appreciable economy in feeding beet pulp, especially if the pigs are usually finished at 26 weeks old. Not more than 1s. per pig would be saved in the cost of the meal and this might easily be offset by a few days longer required for the fattening process. If only 10 per cent. of pulp is given, then the above economies are, of course, halved. On the other hand, the beet pulp can be substituted for barley meal, as was done in two of these trials, if the price difference warrants such replacement. Maize meal, flaked maize and wheat meal may also be replaced by beet pulp, and the above table will serve as a guide to show what savings may be expected when beet pulp constitutes 20 per cent. of the total ration.

Summary.—1. Feeding trials were carried out on farms in Norfolk to demonstrate the effect of including 20-25 per cent. of dried beet pulp in the rations of pigs being fattened for bacon.

2. In two trials the control pigs made a significantly higher live-weight gain. This was due mainly to the pigs refusing to eat the pulp during the early stages, and it is suggested that pigs should not be given 20-25 per cent. of pulp until some weeks after weaning.

3. In the other four trials there was no significant difference in the live-weight gains.

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4. At the bacon factory, 12 of the 16 pigs receiving pulp were grade C or over; 9 of the 16 pigs not receiving pulp were grade C or over.

5. Over the average of the six trials the amount of meal consumed per lb. of live-weight increase was 3.92 lb. when pulp was included in the ration and 3.90 lb. when pulp was omitted.

6. It is suggested that the inclusion of dried beet pulp (either plain or molassed) in the ration of bacon pigs should be governed by the difference in price per ton and per unit of starch equivalent between pulp and the food to be replaced. When beet pulp is more than £1 per ton cheaper, an appreciable economy may be effected by its inclusion in the ration.

REFERENCES

1. Woodman, H. E., Duckham, A. N., and French, M. H.: "The Value of Dried Sugar Beet Pulp and Molasses Pulp in the Nutrition of Swine," *Jour. Agri. Sci.*, xix, Oct., 1929, p. 656.
2. Crowther, C.: "The Work of the Harper Adams College Pig Feeding Experimental Station, 1926-31," *Jour. R.A.S.E.*, 26, 1932, p. 1.

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THE 45th meeting of the Council was held at the Middlesex Guildhall, Westminster, on Thursday, December 12, 1935, with Lieut.-Col. Sir Merrik Burrell, Bt., C.B.E. (West Sussex) in the Chair. The Minister, the Right Hon. Walter E. Elliot, M.C., M.P., the Parliamentary Secretary, Mr. H. Ramsbotham, O.B.E., M.C., M.P., and the Permanent Secretary, Sir. C. J. Howell Thomas, K.C.B., K.C.M.G., attended on behalf of the Ministry.

Status of Ministry.—In opening the proceedings the Chairman welcomed the Minister back to his office after re-election to Parliament. Whilst the Council regretted the loss of Lord De La Warr, late Parliamentary Secretary, who had gone to the Board of Education, it welcomed Mr. Ramsbotham, who had come to take Lord De La Warr's place at the Ministry. Sir Merrik Burrell said that, at the present crisis in agricultural affairs, farmers would be like sheep without their shepherd if they lost Mr. Walter Elliot, and he wished the Council, later in its proceedings, to consider a resolution that had been put into his hand by Sir Arthur Hazlerigg, and which would be moved later, with the permission of the Council, asking the Prime Minister to consider the question of the status of the Department. The Council gave consent to the proposal and later in the proceedings a resolution was passed in the following terms, Mr. R. Bruford seconding:—"That this Council of Agriculture for England is of opinion that owing to the great increase of work and responsibility which now rests on the shoulders of the Minister of Agriculture, to the urgency of questions concerning increased primary production in the United Kingdom while at the same time maintaining the friendliest relations with our Dominions, Colonies and Foreign Powers, the Ministry of Agriculture should be raised to the status of a first-class Department: and that this resolution shall be forwarded to the Prime Minister with a covering letter requesting his sympathetic consideration."

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Minister's Address.—In the course of the Minister's address he thanked the Council for its good wishes for himself, as expressed by the Chairman, and, on behalf of Lord De La Warr, for the Chairman's kind expression of leavetaking. He joined the Council also in its cordial welcome to Mr. Ramsbotham. The Chairman, he said, had used the phrase "stock-taking" in his opening speech. This was clearly now a time for stocktaking. He was not in a position to make a statement on agricultural policy to the Council, since there had been none made to Parliament, where such a statement should first be made, but then the policy had been set out in great detail before the Election and was in fact the same now as then. It was now rather a question of methods than of principles, and as regards continuity, the sympathy of the towns had to be retained. The great world surpluses were more and more being directed towards this country's shores. It was not true statesmanship to say, "We shall merely exclude those surpluses," because in agriculture and industry it was necessary to find some way of absorbing them and working them up so that we got strength from them. That had to go hand in hand with expansion of our home industry. There had been increases in agriculture and industry during the last few years. In the last three years industrial production had increased by 18 per cent. and agricultural production by 14 per cent. The per capita consumption of various foodstuffs had increased very considerably during the last few years, and if that rate of increase could be maintained for a relatively short period of years in the future, we should come up even to such figures as those given by Sir John Orr to the last meeting of the British Association. For a policy of development we must have stability and continuity. It would then be possible to plan ahead and for agriculture to develop its own internal techniques, which had to provide for the problem of absorbing world surpluses. A technique had to be devised by which these would not come into conflict with the efforts of our own people. Now, how was this being done? The policy was the avowed one of encouraging the maximum supply of foodstuffs at the lowest price with a reasonable return to the home producer. Now, as he had said, stability could not

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be attained if the market were subject to flooding by world supplies. It was difficult, since the high tariffs in the world were leading to an increased diversion of surpluses towards this country, for us to continue to absorb these supplies. In 1925-28, the U.K. was asked to take 64 per cent. of the world's beef exports, and in 1932, 82 per cent. In 1925-28, it was asked to take 66 per cent. of the world's butter exports, and in 1932, 76 per cent. Three out of four of all kegs of butter made came to Britain to be sold and consumed here. In wheat and flour in 1926 the percentage of total world's exports received here was 27 per cent. and, in 1932-33, it was over 40 per cent. In these circumstances, some regulation was absolutely inescapable, and he did not think that any section of the nation felt that it could be wholly avoided. Whether regulation should be by quota or tariff or by earmarked tariffs or subsidies, those were questions of method. He thought that the country had gone a good way towards working out a technique, sometimes using plain subsidies, then subsidies derived from earmarked tariffs. Some people said that we should have consumers' subsidies and not producers' subsidies, in other words, subsidies resulting in a general level of prices lower than they would otherwise have been, enabling the consumer to consume more of the article. The essential point was that, however we were to hold up the internal price, we must either do it by withholding from our consumers the enormous surpluses that were available, or by allowing those surpluses to come in, taking a percentage of the fall in value that resulted and using it to maintain home production in this country. He considered that the earmarked tariff or the subsidy method was a technique that enabled us to absorb these tremendous surpluses, and at the same time ensure that they did not operate to the detriment of our home production.

The Minister added that it was essential for the Council to understand these considerations fully or it would be impossible for members to explain them to others, as they would no doubt like to do. He would give half-a-dozen figures which would show the desirability of acting along some such lines. In October, 1934, the price of the 4-lb. loaf in Great Britain was 7½d.; the price of the 4-lb. loaf in Germany was 2s. 1½d.

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In 1934, the price of sugar per lb. in Great Britain was 2¼d.; in Italy 1s. Beef in Great Britain was 10½d.; in Holland 1s. 9d. With the price of beef 90 per cent. (say) higher here than it is to-day, there would be two reactions amongst consumers. There would inevitably be a falling off in the quantity consumed, caused by the higher price, and there would be the further reduction caused by consumers feeling that they were not getting a square deal. The Council had therefore to remember that a reasonable level of prices to the housewives in towns had to be maintained so that home agriculture might secure trust and confidence. Those were the principles on which we would have to go in the years immediately ahead. We were beginning to make sure that the great progress that had been made in the past was not to be lost. We should not regard the present point reached as everything, but should recognize that there remains still much to be done.

The Chairman expressed the thanks of the Council to the Minister for his address.

The Livestock Situation, and Grade and Dead Weight Selling.—*Sir Arthur Hazlerigg* moved the adoption of the Standing Committee's Report. (See Appendix I, page 1011). He called attention to the last paragraph, which summarized the main suggestions in the Report. As regards the first suggestion, urging the Government to press forward as much as possible the negotiations with the Dominions and foreign countries—negotiations that are a necessary preliminary to the establishment of the levy and subsidy plan for meat—Sir Arthur said that the livestock industry's present urgent problem was what was to be done until this plan could be put into operation. The import figures showed that during the 10 months 1934, 1935 and 1936 respectively there had been imported 10,168,000 cwt., 10,617,000 cwt. and 10,594,000 cwt. of beef in various forms. It was the fact that although there had been large cuts in the amounts imported from foreign countries, the difference had been made up by an inrush of meat from the Dominions. Whilst we wished the Dominions well, it was obvious that it did not matter whether the British farmer were ruined by foreign imports or by those from the Dominions. He would

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urge a much more drastic cut for the time being during the period of consultation. He could quite candidly say that this was the worst year for the last 35 years. The Government's White Paper of March 1935 stated that the immediate crisis was being met by a subsidy to the live-stock industry in order to give time for the negotiations to proceed on the proposal for a levy. The subsidy was 5s. per cwt. and prices had gone down by 3s. 8d. He would plead for a guaranteed price. Until the levy could be put into operation, the only alternative was a severe reduction of imports for the time being. All he would ask, for the present, is that the industry be allowed to make a bare living during this interim period.

Mr. Walter Smith said that one had to be careful in these cases to see that the remedy applied did not make the disease worse. If anything were done that had the effect of raising the retail price of meat, there would probably be a reaction so far as the consumers were concerned, which would leave the agricultural position worse in the second case than in the first.

What would happen was that less of the product would be consumed or there would be a change to another commodity. This kind of instability was bad. If the subsidy method were adopted to meet the deficiency in the home price, it was desirable and wise to use surpluses to that end, and therefore instead of putting the burden on the consuming public, it would be on the wealthier classes, who were not limited by means and had a larger choice of foodstuffs than poor people. As regards retail prices, these were high having regard to those the producer was getting, and the problem in regard to meat was really that of finding out how far the large margin between wholesale and retail prices could be reduced.

Mr. J. P. Terry (Glos.), who had been a grazier for about thirty years, said that he was alarmed as to what would happen in the next nine months. He had never known prices at the Christmas market so low, and store cattle were dearer than ever. The position was therefore very precarious; notwithstanding the subsidy, cattle rearing did not pay at present prices. *Mr. A. H. Brown* (Hants) said that the housewife would

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have less to spend as the result of subsidies. Seven millions a year were being collected on the flour subsidy, which meant that the housewife had less to spend on eggs, vegetables, etc., and if more millions were added for meat she would have still less to spend. Producers of the whole range of commodities could not therefore all be made prosperous, as in so doing you were diminishing the consumer's capacity to buy. He wondered whether a more successful policy would not be that of using imports boards. *Mr. A. Matthews* (Hereford) said that he found that retail beef prices were too high. *Mr. J. O. Adams* (Northants) said there was a shortage of cattle, and if it had not been for the Irish cattle this year, graziers in his district would not have been able to get sufficient stock. The question should be considered as to what could best be done to encourage a greater production of first-class live stock in this country. *Mr. R. Anderson* (Northumberland) said he was heartily in agreement with Sir Arthur Hazlerigg. He was a breeder, rearer and feeder of the best Aberdeen beef, and was selling it for 33s. to 34s. per cwt. There should be established at Newcastle a big central market that would ease the marketing situation in the North of England. It should have a grading centre so that the grade and dead-weight basis of sale could be adopted. *Mr. J. S. Gibbons* (Glos.) said that the present tendency was for farmers to turn from cattle raising to milk production. The full effect of this tendency would not be felt for a few years; store cattle would be fewer and the grazing position would, if not remedied, become very serious and difficult. *The Minister* said he was very glad to have had the benefit of the discussion and the suggestions which had been put forward. He agreed that the store position had to be kept very closely in mind in devising a long-distance policy, and that nothing should be done to prevent the man who turned out the top grade beast getting the top price. Any assistance that did not encourage quality production meant that there would be a level of rough stuff which the housewife did not want. *Mr. Brown* had suggested imports boards. The essence of the imports boards idea was that by averaging up low-priced produce brought from abroad a higher price could be

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afforded for home produce. The really useful part of the idea was already in operation. He could assure the Council that these matters would receive his closest attention.

The Report was then adopted.

Derelict Estate in Hants.—*Mr. George Dallas* moved the adoption of the Standing Committee's Report (see Appendix II, page 1013). He said that all would agree that it revealed an extraordinary state of affairs. He detailed the steps which the Standing Committee had taken as a result of the Council's reference to it of Mr. H. W. Thomas's resolution on the subject. The position itself was sufficiently explained in the Report. The Standing Committee, he said, was definitely of one opinion, that further decline should be stopped and the whole matter then put right. The Minister they knew was labouring under certain disability because of the decision of the Government not to put the Land Utilization Act into operation. The suggestion was that that decision should be reversed for the purpose of this particular case, or that the Commissioner for the Special Areas should take the estate over under his powers. He hoped that the Council would endorse the recommendations unanimously and leave the matter to the Minister to adopt whatever method he preferred.

Mr. H. W. Thomas expressed his appreciation to the Standing Committee for the excellent Report they had drawn up and his thanks to Mr. Dallas for his presentation of the case. In Hampshire they felt the position very seriously. He hoped the Minister would take steps immediately. The longer the land was left uncultivated, the longer it would take to get it back into cultivation. The longer men remained unemployed the less were they capable of doing work. *Mr. Christopher H. Turnor* said that the recommendation that appealed to him most was that under which the Commissioner for Special Areas would take over the land, i.e., provided that he could get for it what it was worth. At present it would be worth very little. The Commissioner could then hand the estate over to the Land Settlement Association. One of the things that had impressed him when he was in Germany last June

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was the plan in operation there by which low-priced land was bought and improved by the settlement of workers on it. Where reclamation was involved experts were brought in, so that he would suggest that in this case the Ministry of Labour should be brought in on the question of reconditioning the estate.

The Report was adopted.

Warble Fly Pest.—*Mr. Clement C. Smith* (East Suffolk) moved the adoption of the Standing Committee's Report (see Appendix III, page 1016). It was, he said, really a question of pounds, shillings and pence whether it would pay to eliminate the warble fly. He believed that it would pay, because of the enormous injury caused to meat, the loss of milk and flesh that occurred on account of the pest. In Denmark, in 1933, similar action had been taken. He was sure that if farmers loyally supported the Order the pest would quickly be eliminated. *Sir Arthur Hazlerigg* also spoke to the motion, which was put to the meeting and carried.

Vegetable Marketing.—*Lord Eltisley, K.B.E.* (Cambs.) moved the adoption of the Standing Committee's Interim Report on the Ministry's Report as to Vegetable Marketing in England and Wales (see Appendix IV, page 1016). He said that the Standing Committee's Report was based on their first perusal of the Vegetable Marketing Report of the Ministry, which was a most valuable contribution to the statistics of the industry. In 1872 only 34,000 acres were devoted to the cultivation of vegetables. In 1921, 229,000 acres were so devoted. From the health point of view, the consumption of fresh vegetables, which formed an increasing part of our dietary, was important. There should be an improvement in quality and freshness to the consumer. There should be more standardization of production and marketing; there should be more standardization of trade practices. He then referred to the anomalies of the Horticultural Produce (Sales on Commission) Act, 1926, as detailed in the Report. He saw no reason why, if the Dominions took advantage of the Act, our own producers should not also do so. The Dominions had their inspectors at work to see that

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returns were properly made. Commission salesmen who were also merchants were not devoting the whole of their energies to the benefit of their growers, so that they should be under some kind of regulation. Another point was the need for accurate labelling of dried peas, dealt with in the last paragraph of the Report.

The Report was adopted.

Sheep Dipping.—*Major F. H. Fawkes* moved the adoption of the Standing Committee's Report on a Suggested Universal Double Dipping Order for the Eradication of Sheep Scab (see Appendix V, page 1019). *Mr. C. H. Roberts* (Cumberland) suggested that the Government might make the districts for the double dipping Orders applicable more nearly to the districts of infection. He did not see why they should operate only by county. *Mr. J. O. Adams* supported the Report, stating that the existing regulations worked very well. *Mr. D. G. Watkins* (Hereford) spoke in favour of a Double Dipping Order throughout the country, from the point of view of the vendors of sheep that were brought into Hereford. He said that the regulations as they acted in that locality caused an enormous amount of trouble and expense. *Sir Charles Howell Thomas*, on behalf of the Ministry, reminded the Council that some time ago the Ministry circularized the whole of the local authorities throughout the country on the question of sheep scab, and the experience then gained showed that compulsory double dipping applied throughout the country would not receive the whole-hearted co-operation of sheep raisers. Double Dipping Orders were made in instances where Orders were required, and these, as a matter of fact, were not necessarily limited by county boundaries. County Councils also had the power of making Double Dipping Orders.

The Report was then adopted.

Spahlinger Vaccine for Tuberculosis.—On behalf of the Standing Committee, *Lord Cranworth* (East Suffolk) moved—

That in view of the Report on the recent experiments in Northern Ireland, the Council trusts that His Majesty's Government will do its utmost to arrange further investigation on an adequate scale to test the value of *Mr. Spahlinger's* vaccine in the prevention of tuberculosis in cattle.

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He said that he felt certain that the Council appreciated the work of Mr. Spahlinger, who had given not only his time and money but his health to the service of humanity. He would call the Council's attention to only one or two points. First, the experiments had been started about 19 years ago and there had been two experiments in this country—the first in Norfolk in 1930 and the next in Northern Ireland. He then referred to the conditions under which the experiments in each instance were undertaken. The Report on the Northern Ireland experiments was, he said, a remarkable document. Doubtless there were criticisms of a scientific nature that could be made in regard to it. He was not a scientist, but he understood that there were very few scientists who were not prepared to criticize the work of the others. Here to-day, the Government, who were fully aware of the need for improving the purity of the milk produced in this country, might spend a definitely adequate sum—small, however, in relation to the sum spent on the Attested Herd Scheme—in carrying out any further experiments necessary with the Spahlinger vaccine. *Mr. Bruford* seconded the motion. *Mr. Ramsbotham*, on behalf of the Ministry, said that the Minister was looking forward to the initiation at a later date of further scientific investigation. He could not say more than that at the moment.

The resolution was put to the Meeting and carried.

Tuberculin Test for Imported Cattle.—*Mr. D. G. Watkins* moved—

That the Council of Agriculture for England recommends to the Ministry of Agriculture that all cattle entering this country from foreign ports shall be subject to the Tuberculin Test in the same manner as cattle exported from this country are required to be tested.

He said there had been an increase in tuberculous cattle in Herefordshire. He hoped that some measures could be taken to ensure that cattle coming into the country should be tested in the same way as cattle were tested when they were received abroad from Great Britain. *Mr. A. Matthews* seconded. *Mr. R. G. Patterson, O.B.E.* (Staffs) said he was not aware whether the mover regarded the Irish Free State as a

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foreign country. If he did, then here was a picture of the seriousness of the store cattle position. If all Irish store cattle should be subjected to the test, we should get very few of them here, and that would be disastrous under present conditions. The rush into milk production had put a tremendous number of second-class cows on the market. *Mr. B. Sanders* (Isle of Wight) said that he hoped that the Council would not pass the resolution. There was a shortage of good breeding cattle in the country. *Mr. W. R. Smith* said it appeared to him that some members of the Council were taking up a contradictory position in this matter. On the one hand, they were doing their best to remove disease, and on the other trying to prevent steps that should check it. It was the same with the scrub bull proposals a few years ago. The Standing Committee should, in his view, be asked to look into the question. *Mr. Ramsbotham* said that the proposal would be very difficult to operate. For example, a single tuberculin test would not show whether the animal was or was not free from tuberculosis. Again, the position as regards tuberculosis in cattle in England and Ireland was much about the same, and if tests were insisted upon there would be grave interference with the necessary trade in cattle. He thought it would be unwise for the Council to adopt the resolution.

After further consideration, it was decided that the resolution be referred to the Standing Committee for consideration and report.

Rural Housing.—*Major F. H. Fawkes* moved—

That the Standing Committee be asked to examine the existing situation as regards the powers of individual owners, local authorities and other bodies in respect of rural housing under the Housing Acts of 1926 and 1935, and the use made of those powers.

He had, he said, found amongst well-informed persons a unanimous view that the housing conditions of agricultural workers were not in accordance with the standard required in the 1935 Act. Devonshire had done very good work in improving rural housing, and his object in moving this motion was to draw attention to the matter and get it examined by an agricultural body. *Mr. G. E. Hewitt* seconded the resolution. He

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said that in spite of the Acts very little was being done in country districts. In some rural districts families had been turned out of condemned houses with no other cottages to receive them. *Mr. H. E. S. Upcher* (Norfolk) and *Mr. W. B. Pinching* (Middlesex) supported the resolution, which was put to the Meeting and carried.

New Draft Milk (Special Designations) Order.

—*Mr. A. Symonds* (West Suffolk) moved—

That this Council would view any relaxation of the present standards of designated milks—such as it understands is to be proposed in the draft of the new Milk (Special Designations) Order of the Ministry of Health—as not in the best interests of public health; and this for the reason that such relaxation would be likely (1) to undermine the producers' efforts to increase the confidence of the consuming public, and (2) to hinder the present successful efforts now being made for cleaner and better milk.

His view was that the new draft Order of the Ministry of Health aimed at lowering the standard of milk production rather than improving it. *Lt.-Col. G. H. Long, O.B.E.*, seconded the motion. *Mr. Charles Roberts* said he looked with some suspicion at the resolution, and if the new draft regulations were giving fewer and simpler grades he was in favour of them. *The Chairman* then explained that the new draft Order did not intend to lower the standards of milk, and the mover was labouring under a misapprehension in this regard. The Ministry of Health had viewed the old "Certified" milk as a luxury article at a very high price, bought only by a few wealthy people. The Ministry proposed to abolish that grade, or rather to amalgamate it with "Grade A. (T.T.)." "Grade A." milk was the same as before, only it might be called by another name, e.g., "Standard." At this point *Sir Arthur Hazlerigg* moved that the matter be referred to the Standing Committee.

The mover and seconder having agreed to this proposal, the Council agreed to the matter being referred to the Standing Committee accordingly.

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APPENDIX I

Being a Report from the Standing Committee of the Council of Agriculture for England on the Meat Situation and the Scheme for the Marketing of Fat Stock by National Grade and Dead Weight

1. Since its last Report to the Council on the subject of the meat situation, the Standing Committee has continued to give careful attention to the difficult problems which surround the live-stock farmer in this country. It welcomed the extension of the Cattle Subsidy Act to cover the period of the Government's negotiations with the Dominions and foreign countries with the object of arranging a long-term plan of a levy on imports with a preference to the Dominions, the proceeds to be applied to assisting the industry in this country. As far as cattle, the most important item of our live-stock industry, are concerned, however, the very severe strain on producers, through uneconomic prices, still continues, and the Committee hopes that the remaining stages of the meat negotiations with the Dominions and foreign countries will be carried through with the utmost possible speed in order that that large section of the industry may be restored to a healthy condition without further delay.

2. As the Council is aware, the Committee has always been eager to recommend improvements within the industry which will, by reducing costs or improving producers' prices, help towards efficiency and stability. There are many matters which require to be carefully scrutinized in an examination of the position, and these are set out ably and in detail in the Report of the Reorganization Committee on Fat Stock. It appears to the Committee that the position will never be satisfactory until an extensive system of central slaughtering can be adopted. Then, and only then, will the farmer be practically certain of getting a full and fair return for his meat according to its dead weight and the proper values for the hides, skins and offals as well. Short of such a system, the Standing Committee considers that the farmer cannot do better for himself than use the Ministry's scheme for the sale of fat stock by National grade and dead weight as an alternative to the ordinary means of marketing fat stock alive at auctions. It will be remembered that this scheme was inaugurated by the Ministry for fat cattle in 1930, and extended in 1933 to sheep and lambs, and in the following year to calves, pork pigs and sows. Facilities are now available for dealing with consignments of all classes of fat stock, under the scheme, at London, Birmingham, Liverpool, Leeds, Bradford, Halifax, Sheffield and Manchester. Without any widespread campaign of recommendation, the scheme has slowly increased in popularity, especially amongst those farmers who find the conditions at their markets difficult for the favourable selling of their fat stock. The most recent figures, showing the numbers of live stock brought under the scheme, are the following :—

For the ten months January-October, 1934 and 1935

			<i>Cattle</i>		<i>Sheep</i>		<i>Pigs</i>
1934	..	..	4,346	..	16,860	..	1,121
1935	..	..	9,106	..	22,515	..	4,961

3. It may be useful to recapitulate the general lines of the scheme. They are these: a farmer having fat stock of any kind to sell puts himself or his agent in touch with the Ministry's Head Meat Grader at one of the wholesale meat markets at which the scheme is operated, informing him of the numbers and classes of stock he has for disposal. The grader then obtains, from reliable wholesale carcass butchers, quotations for the animals in three qualities of meat. The quotations

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constitute a firm offer to the farmer of prices for his animals at their certified dead weight after slaughter, according to the quality which the official grader decides thereafter that they reach. The offer can be accepted or rejected without moving the animals from the farm. It is clear that the fact that firm offers of this kind can be obtained for all classes of fat stock must have a steadying influence on prices offered for the stock alive at the various cattle markets. No farmer will readily sell stock for less than the best price he can obtain, and if he knows the price the wholesaler will give him, he is in a better position to decide whether he should accept the offer or sell his animals through the auction ring alive.

4. It appears to the Committee that the scheme is capable of considerable extension in this country. Its still limited use is probably, to a large extent, due to the fact that it is not sufficiently known amongst farmers, even in those districts which normally supply the fat stock markets at which there are official graders. In the more distant districts, it is probably not known at all, or if known is not seriously thought about as an alternative plan of selling, on account of the costs and difficulties of transport. The Committee would therefore strongly advise that the number of wholesale meat markets at which the Ministry provides an official grader should be increased, so as to cover a much larger area of the country. Grade and Dead weight centres should, in its view, also be set up in Scotland and Northern Ireland so that those in the North of England will not be over crowded with stock for sale under the scheme when it becomes more generally adopted. In order to encourage sales by grade and dead weight it would be advisable for the National Farmers' Union or other local bodies to establish area organizations or committees for the purpose of disposal of stock. These organizations or local Committees would appoint agents for the purpose of collecting offers of stock and obtaining for the owners quotations from wholesalers through the official grading centres. Under a more extended scheme, such as we now contemplate, farmers and officials would require to be assured of the financial reliability of the particular wholesalers with whom they deal, and to meet that need we suggest that wholesalers who desire to act in the scheme should be required to give satisfactory guarantees of financial stability. These would no doubt be readily supplied, and it would be mere business prudence on the part of the farmers to require them in such an extended scheme. Official graders cannot, of course, be held in any way responsible for financial transactions under the scheme.

5. The setting up of farmers' committees for this purpose is no new thing, as we find that the Grade and Dead weight scheme has been operated in Yorkshire for some time through the medium of a farmers' co-operative auction mart; and, in Wales, by committees mainly composed of nominees of the National Farmers' Union, which have designated group agents to deal with particular areas.

6. It is suggested that farmers will readily see the value of this system of sale as regards calves and lambs, where small lots can be collected from different farms to make up consignments sufficiently large to command the lower transport rates, and to supply the reasonably large numbers which wholesale carcass butchers usually require. Better returns are likely to be obtained through the sale of calves and lambs this way; and it is suggested that there is at present much loss to farmers in dairy districts through the haphazard selling of young calves.

7. As regards cows for slaughter, the farmer also stands to gain considerably by using the scheme. Fat cows are of no small import-

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ance to the industry, as not far short of 40 per cent. of the home-killed beef coming on to the market at the present time is cow beef. Many of the animals are at present sold to regular dealers in cow beef at prices which may fall short of their proper wholesale value because of the risk, with this class of animal, that disease may exist and some part of the carcass will be condemned by the Public Health Authority. Allowance is made for that risk in the price offered for cows bought on the hoof, but if they are sold dead weight on wholesalers' quotations for quality, farmers are likely to get better value, and value for all the meat that goes on to the market. In addition, provision is made under the Scheme for insurance against loss due to condemnation.

8. As mentioned in a previous Report, the Committee would like to see the lower grades of cow beef taken to the retail market altogether and sold wholesale to firms for processing. The other cow beef should be graded so that only the best can come into competition with prime steer beef. The lack of grading of this class of beef is harmful to the reputation of home-killed beef, as it is only to be expected that inferior cow beef will occasionally find its way into shops where only better class meat should be sold at the better prices. The Committee considers that the greater use of the "dead-weight" scheme in the sale of cow beef would prepare the way for a general grading and marking of this class of beef, an end which in the interests of beef consumption in this country is very much to be desired.

9. To summarize the main suggestions in this Report :—

- (1) that the Government be urged to press forward as much as possible the negotiations with the Dominions and foreign countries which are a necessary preliminary to the establishment of the levy and subsidy plan in the case of meat :
- (2) the extension of the National Grade and Dead-weight Scheme to several more markets so as to cover as many as possible of the districts in which it can be of use, whether for the sale of fat cattle of all classes, calves, sheep and lambs, or pork pigs :
- (3) the formation of associations or groups of farmers, as has been already done in Yorkshire and Wales, so that these may appoint agents for the purpose of obtaining quotations from wholesalers through the official grader's office, and of subsequently arranging for the transport of the stock according as they are sold :
- (4) obtaining from the wholesale carcass butchers who quote under the schemes a guarantee of financial stability in respect of all transactions at the market, so that the bargains arranged through agents and the official graders can be carried through with reasonable precautions against loss.

November 21, 1935.

APPENDIX II

Being a Report from the Standing Committee of the Council of Agriculture for England on a Derelict Estate in Hants.

1. At the last Meeting of the Council (May 23, 1935) the following resolution, moved by Mr. H. W. Thomas, one of the representatives of the Hants County Agricultural Committee, was referred to the Standing Committee for consideration and report :—

"That there being about 3,000 acres of land derelict in the County of Hampshire, this Council is in favour of this land being acquired and devoted to some useful purpose."

The Standing Committee has interviewed Mr. H. W. Thomas and has

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received assistance in ascertaining facts from officers of the Hants County Council and of the Ministry of Agriculture and Fisheries, and now reports as follows :—

2. The land is known as the McCreagh estate, and is situated in the Parishes of Barton Stacey and Wonston, about midway between Winchester and Andover. It comprises about 3,000 acres made up mainly of eight farms known as Ragbourn, Moody's Down, Cocum, Street, Manor, Drayton Pump, Drayton Lodge, and Upper and Lower Cranbourne. The soil is a varying depth of loam over chalk, and is said to be of a grateful nature when well farmed, growing good crops of wheat, barley, turnips and mangolds. It has been suggested that, on the deeper portions of the estate, sugar-beet might be successfully grown. Up to about 1920, the farms were occupied by substantial farmers, and were adequately equipped with houses, cottages and farm buildings. It is said that five of them, totalling about two-thirds of the area, carried before the War about 1,500 sheep, 100 head of cattle, 40 horses, and employed about 50 men. The other farms were also adequately stocked, and employed the needful amount of labour for full cultivation. To-day, the area is for the most part derelict and growing weeds instead of crops, the hedges are uncut and spread into the fields, and the farmhouses, buildings, and cottages are nearly all in a ruinous state of disrepair.

3. The owner, who is understood to be tenant for life, is a Mr. M. C. McCreagh. He does not reside upon the estate. A tithe of about £750 is stated to be payable on the whole area, and this presumably, as the land is uncultivated and without recognized tenants, remains unpaid. The Hants County Council has on several occasions since 1920 taken what action it could to endeavour to remedy the unsatisfactory condition of the estate. In 1921, it directed that the owner in the case of three of the farms (Ragbourn, Manor, and Street Farms, comprising about 750 acres) should be called upon to show cause why notice should not be given under Section 4 of the Agriculture Act, 1920, requiring the occupiers to cultivate them according to the rules of good husbandry. The Corn Production (Repeal) Act, 1921, however, soon after came into force and repealed Section 4 of the Agriculture Act, 1920, though it retained the power to enforce the destruction of certain injurious weeds, the spreading of which is calculated to do much harm to adjoining properties. In 1922, therefore, an area of injurious weeds amounting to some 500 to 600 acres was cut by the direction of the County Council after the requisite notice had been given to the owner and not complied with, but, owing to various legal difficulties, the cost of the work could not be recovered. During 1923, notices were again served to cut the weeds on seven of the farms and seven summonses were subsequently issued, but, again, owing to difficulty in fixing legal responsibility, proceedings were not taken. Later years have a similar tale of unsuccessful efforts, both by the County Council and the Ministry of Agriculture, to deal with this growing menace to the neighbouring agriculture, though it should be mentioned that when, in 1929, the owner was served by the Ministry with six notices to destroy the weeds, convictions were obtained in all cases with penalties of £20 in each and £1 a day for every day after 14 in which the owner failed to comply with the judgment. He lodged an appeal in the High Court which was dismissed, and as he made no payments whatever up to August of the following year, he was then arrested and committed, but was released after 4 days on payment of the penalties and fines. Meanwhile, some of the weeds had, in fact, been cut, and the proceedings contemplated as regards continuing offences had to be abandoned.

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This recital of facts illustrates the difficulties with which authority is faced in trying to deal with the estate, and shows why, in spite of all its efforts, no substantial improvement was ever effected.

4. In 1931, the Agricultural Land (Utilization) Act was passed, Section 2 of which gave power to the Minister to acquire neglected land for the purpose of reconditioning. The Act expressly stated that if it appears to the Minister that any piece of land suitable for use for agricultural purposes cannot be satisfactorily and economically used by reason of its being in a seriously neglected condition, he may, after consultation with the Council of the County or County Borough, and after giving notice to the owner and occupier, (1) authorize any person to enter on, inspect and report; (2) serve upon the owner a notice requiring the execution of specified works; and (3) if the works are not done, purchase the land otherwise than by agreement and hold it and recondition it. Various other provisions occur in the Section, none, however, giving precise directions as to what shall be done with land when reconditioned. It appears to the Committee that, in such a case as the present, the consideration of this last matter, if action should be taken under this Act, would be best left to the Minister. It would doubtless take some few seasons to recondition the land, and it may then appear expedient to adopt a course in respect of it, which did not suggest itself at the beginning of reconditioning operations. There is an alternative course, i.e., that the County Council should acquire the land under the Small Holdings Acts for the purpose of statutory small holdings, if they were justified by reason of a demand, present or potential, for the type of holding which could be provided. Another possible utilization of the land would be to make it the subject of a scheme for the settlement of unemployed men from the Special Areas. In such event, it would come under the control of the Commissioner for the Special Areas, or of the Land Settlement Association acting on behalf of the Commissioner.

5. In considering this last possibility as to ultimate use, another suggestion for dealing with the estate from the very beginning presents itself to the Committee. It is that the Commissioner for the Special Areas should himself acquire the estate under his compulsory powers and prepare a scheme by which suitable unemployed men from the Special Areas could be brought on to the land to recondition it as a preliminary to land settlement. This course appears to us to have certain advantages over the alternative course named in the preceding paragraph, one of which is that the net cost of reconditioning, so far as the State is concerned, would be likely to be considerably less than would otherwise be the case. The reason for that, as the Committee sees it, is that even if the gross cost of reconditioning were more when undertaken by the Special Commissioner, the State would, during the progress of the work, save the amount that would otherwise be spent in unemployment benefit. How far the Land Settlement Association could be of assistance to the Special Commissioner in carrying out part, or the whole, of the subsequent land settlement is a matter which that Association might be glad to consider in due course.

6. With this brief review of the position, the Standing Committee recommends the Council to ask the Government to take such action as it can in conjunction with the County and other Authorities to remedy what can only be called a disgraceful condition of affairs. It is not in the national interest that so much land capable of producing food should be allowed to remain uncultivated year after year and so revert in time to weed and brushwood. The owner, apparently, is

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determined not to face up to any responsibility which may attach to the ownership of agricultural land, as tenant for life or otherwise, or even to consult his own or his family's interests in the matter. It, therefore, in our view, becomes necessary for authority to take action to set the matter right, and we suggest it could be done in one or other of the ways indicated in this Report.

November 21, 1935.

APPENDIX III

Being a Report from the Standing Committee of the Council of Agriculture for England on the Warble Fly Position

It will be remembered that, in June, 1934, the Standing Committee presented a Report to the Council following on a Resolution passed by the Council on the motion of Mr. W. Hearle, of Cornwall, in December, 1933, in favour of steps being taken for the eradication of the warble fly pest from this country, provided similar steps were taken in the countries which were permitted to export live cattle to Great Britain, so that the pest would not be in the state of being continually re-introduced. The Standing Committee gathers that the Ministry's views are largely in agreement with those adopted by the Council, and that since the date of the Report the Department has endeavoured to get agreement with the Governments of Ireland, as regards imported stock, and with the National Farmers' Union so far as willing adherence of the farmers in this country is concerned. It appears that the Ministry has so far been successful with these negotiations; and the Committee understands that shortly it is proposed to issue an Order to come into force next spring, by which owners of cattle will be required to dress infested cattle with a suitable dressing at stated times, or otherwise treat in the spring and early summer of each year when the warbles are being expelled from the hides.

The Committee very much welcomes this advance, as it feels that the farmers themselves, and the country as a whole, will gain considerably by the elimination of the warble fly. The farmer's gains will be shown in improved prices for his hides under a well-organized system of selling cattle and by the absence in his fat stock of "licked" beef, and in his dairy herds of reduced supplies of milk.

The Standing Committee trusts that the Council will urge all farmers in the country to do their utmost to observe the requirements of a Warble Fly Order to the fullest extent. It may remind them that no pest is likely to be eliminated without some trouble and expense. In the first year or two this may be considerable, but it should diminish rapidly, and after a few years' intensive work by all live-stock farmers, a full reward will be reaped in the better prices which will then be paid for the better meat and skins produced.

November 21, 1935.

APPENDIX IV

Being an Interim Report from the Standing Committee of the Council of Agriculture for England on the Ministry's Report as to Vegetable Marketing in England and Wales (Economic Series No. 25)

1. The Council will remember that, at its Meeting in May last, the Standing Committee tabled a further Report on recent increases in vegetable production. In that Report, it looked forward to the

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publication of the Ministry's comprehensive Report, which had at that time already been a few years in preparation. It drew attention to certain factors then existing in the horticultural situation and anticipated that these would be dealt with amongst other matters in the Ministry's Report. Briefly, these were that distribution should be organized on lines which would put vegetables on the consumer's table in the freshest possible state, and that, in order to understand the importance of freshness at the time of consumption, research should be undertaken to demonstrate it. Further, that there appeared to exist at the present time an outstanding opportunity for home growers to increase their acreages of onions, peas, carrots, horseradish and red cabbage and other vegetables for pickling, and it was suggested that additional growings of some of these vegetables would be encouraged by additions to, or changes in, the tariffs concerned, and that if the Import Duties Advisory Committee felt they could not deal with them, particularly with onions, by way of revised duties, because these crops could not be said to be already "substantially" grown in this country, that body should be urged to seek powers to enable it to do so.

2. The Standing Committee found that the Ministry's Report did, in fact, deal with most of these questions together with many others; but the Committee has not yet had time to consider all the information, suggestions, and recommendations that it contains. The Committee hopes to do this later, and to present a further Report at the next meeting of the Council. One or two matters, however, call for special mention now, and this interim Report is therefore presented.

3. First, the Ministry's Report makes the suggestion that the two most important matters requiring attention in the industry at the present time are (1) the need for standardization of product, pack, and package, in order to secure better presentation, better distribution, and ultimately better demand; and (2) the standardization of trade practices.

4. With these suggestions the Committee cordially agrees, and in connexion with (2) it has already discussed one trade practice by which commission salesmen at vegetable markets do not furnish growers with detailed statements of the prices obtained for particular consignments of produce and of the charges made in respect of their sale. The Committee wishes to draw attention to the fact that, under the Horticultural Produce (Sales on Commission) Act, 1926, the salesman is required to deliver such a statement as soon as practicable after the sale, though he is not legally liable to do so in cases where the grower does not send to the salesman before the sale an advice note specifying the nature and description of the packages consigned and the contents thereof. Further, the Act enables a grower and a salesman to enter into an agreement in writing that produce consigned for sale shall be deemed not to have been consigned for sale on commission, in other words, allows of an agreement not to observe the provisions of the Act. Now it appears to the Committee that it is of importance to the grower that he should get the returns specified, and should, through his accountant, be in a position to consult the salesman's books as and when occasions may require, as provided in the Act. The Committee is informed that whilst Dominion growers sending produce to this country take full advantage of the Act, the large majority of home growers do not. For these, the Act is practically a dead letter, mainly for the reason, as the Committee understands it, that growers are reluctant to take the risk of disturbing the cordial and confidential relations which should exist between grower and commission salesman.

5. It appears to the Committee that the main question involved is

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an important one to growers, and that steps should be taken in the general interests to amend the provisions of the Act, so as to make it effective as to its main purpose, and then to see that the amended provisions are complied with. It would be an advantage if the whole question could be taken up by the Ministry of Agriculture on behalf of the growers, and, if necessary, inspectors appointed by the Ministry or the National Farmers' Union to detect lapses and to examine complaints, except where such require the actual inspection of books and accounts. The latter should only be entrusted to certified accountants as provided in the Act. All good salesmen will, no doubt, be very willing to keep accounts in some agreed form to comply with the Act, and to allow, even to welcome, inspection of their books by certified accountants. Where a commission salesman fails to keep the necessary records and to deliver a proper account to the seller, he is liable, under the Act as it stands, on summary conviction, to a fine not exceeding twenty pounds, and, in the case of a subsequent offence, to a fine not exceeding one hundred pounds. If there is difficulty in finding parliamentary time to obtain an early amendment of the Act, the Committee suggests that the matter might be discussed with the representatives of growers with a view to arrangements being made for them, as a matter of general business practice and from a definite date, to insist on compliance with the Act as it stands, pending its amendment.

6. The attention of the Committee has also been drawn to the fact that in some cases merchants who buy and sell produce on the market on their own account are also commission salesmen for others. It occurs to us that it would be wise, when amendment of the Act is taken in hand, to consider whether limits can be defined for the business of a merchant and a commission salesman on vegetable markets, and whether the statute could lay down the conditions under which the two functions may properly be allowed to be discharged together.

7. The Committee wishes again to draw attention to the opportunity that exists for much larger acreages of onions, and crops for pickling to be grown in the country. The onion crop is one which needs a considerable amount of hand labour, and it would be very much in the national interest to encourage its extension. It is, however, important, before growers embark on any big scheme, to make sure that they can obtain plentiful supplies of good seed of the kind that is likely to do well on their soils. The Agricultural Organizer for the County will probably be able to advise on this subject. The Committee proposes later to get the opinions of representatives of the pickling trade as to the prospect of their being able to take some of the produce of an extended onion acreage at home, instead of, as at present, getting the bulk of their produce from abroad.

8. In concluding this Interim Report, the Committee desires to refer again to the question of dried peas, which are imported, processed here to make them fit for canning, and turned out as green English-canned peas. There is the point that these large importations of dried peas compete (1) with the home-grown produce of a similar description which is canned in the same way, and (2) with the canned fresh-picked pea, which is probably the best canned product on the market. It is true that the consuming public can safeguard itself by insisting on being supplied with National Mark brands when they require the better class article; but the Committee still considers that there is too much room for mistake by the consumer and would like to see a clear difference made in the labellings of the cans (1) of fresh green peas; (2) of English-grown peas that have been dried, processed

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and canned ; and (3) foreign-grown peas, imported dried, which have been processed and canned in this country.

November 21, 1935.

APPENDIX V

Being a Report from the Standing Committee of the Council of Agriculture for England on the suggested Universal Double Dipping Order for Eradication of Sheep Scab in Great Britain

The Herefordshire County Council, on July 30 last, sent the following resolution for the attention of the Council :—

The Committee have had under consideration a letter from the Salop County Council asking whether this Authority would make regulations for the dipping of all sheep in the County once during each of the following periods, July 15 to August 31 and September 1 to November 30. This Authority's Regulations provide for a single dipping during the period July 15 to August 31, and the Committee are of opinion that the suggested second dipping period, namely, September 1 to November 30, is somewhat late.

The Committee, furthermore, are of opinion that for the speedy eradication of sheep scab it is essential that there should be a universal double dipping order. At the moment, therefore, they do not recommend that the action taken by the Salop Authority should be followed, but they do recommend, in the strongest possible terms, that further strenuous efforts should be made to secure the coming into operation of *a universal double-dipping order*.

The Standing Committee has examined the position and, on the facts, as it finds them, feels compelled to disagree with the County Council's conclusion. The reason for this, briefly, is that the requirement of general double dipping would press with altogether unreasonable hardship on the many counties in Great Britain in which sheep scab is known not to exist. The present policy is for local Orders, requiring double dipping within a prescribed period, to be operative only in those districts where sheep scab is present.

It has to be remembered that sheep scab is not a highly infectious disease like those for which drastic regulations of a general character, applicable to every part of the country, are necessary ; and the success of the regulations which are judged by responsible authority as necessary to control this disease depends to a large extent on the cordial acquiescence in them by sheep-owners. There seems little doubt that the present regulations give satisfaction to a large majority of the sheep-owners in the country.

November 21, 1935.

LICENSING OF STALLIONS UNDER THE HORSE BREEDING ACT, 1918

THE following table shows the number of stallions licensed under the Horse Breeding Act, 1918, in each year since 1929 :—

		Service Season.						
		1929	1930	1931	1932	1933	1934	1935
Shires	.. ..	760	752	761	853	888	962	1,074
Other heavy horses		329	335	342	358	387	471	542
Light horses	..	347	343	329	266	241	254	277
	(including ponies)							
		1,436	1,430	1,432	1,477	1,516	1,687	1,893

It will be observed that the total number of licences issued in 1935 shows a further rise and continues the steady increase which has been noticeable during the last few years. The total for 1935 is 206 in excess of the 1934 figure, while as compared with 1931 the increase amounts to 461, or 32 per cent.

Numerically the greatest increase in heavy stallions was shown by Shires, in respect of which 1,074 licences were issued; this is 112 more than in 1934, or an increase of nearly 12 per cent. Relatively larger increases, however, were shown by other heavy horses, Suffolks rising from 182 in 1934 to 210 in 1935 (15 per cent.), Clydesdales from 163 to 184 (13 per cent.) and Percherons from 71 to 80 (13 per cent.). The number of light stallions licensed was 203, which is an increase of 22 over the 1934 figure, and is mainly attributable to the greater number of Thoroughbreds licensed. There were slight increases in the number of Hackneys and Hunters licensed, but slight decreases in the number of licences issued in respect of Arabs and Cleveland Bays.

The number of cases in which licences were refused showed an increase of 7, 52 stallions being refused in 1935 as compared with 45 refusals in 1934. In 14 instances appeals against refusals were lodged and 9 of these were successful, as against 7 appeals, of which 5

LICENSING OF STALLIONS

were successful, recorded in 1934. The breeds of the rejected stallions and the reasons for rejection are set out in the following table:—

NUMBER OF APPLICATIONS FOR LICENCES NOT GRANTED AND GROUNDS FOR REFUSAL, 1935.

Breed	Number refused	Percentage refused	Disease								
			Whistling	Roaring	Sidebone	Cataract	Stringhalt	Ringbone	Bone Spavin	Defective Genital Organs	Poor physique and conformation
PEDIGREE											
Clydesdale ..	3	1'9		1	1	1					
Percheron ..	1	1'3						1 (a)			
Shire ..	22	2'3	3	6 (a)	5	3	1	2		1	1
Suffolk ..	6	2'9	1	3 (a)	1	1					
Thoroughbred	3	1'8		1 (d)				1	1		
Welsh Cob ..	1	5'6					1				
NON-PEDIGREE											
Heavy ..	16	5'7	1	1	8 (h)	1 (c)		1	3		1
	52	2'7	5	12	15	6	2	5	4	1	2

(a) One also affected with sidebone.

(b) One also affected with whistling.

(c) Also refused for ringbone.

(d) Also refused for poor foaling percentage.

The number of infringements of the Act reported to the Ministry during the season was 47, an increase of 21 on the number reported in the preceding season. In three instances proceedings were taken by the police in respect of the travelling of unlicensed stallions; in two cases convictions were recorded, but the third case was dismissed. Most of the other infringements reported were in respect of the travelling or exhibiting for service of licensed stallions unaccompanied by their licences, and in these instances the owners and leaders were warned by the Ministry or police as to the requirements of the Act in this respect.

Stallion owners in possession of licences for the year ended October 31, 1935, are reminded that these licences expired on that date, and should be returned to the Ministry. Application for licences for the 1936 travelling season may now be made, and it will

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greatly assist the Ministry to make economical arrangements for the examination of stallions if applications are made as early as possible. Application forms may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

NUMBER OF APPLICATIONS FOR LICENCES AND NUMBER OF LICENCES GRANTED AND REFUSED IN ENGLAND AND WALES, 1934-35.

Breed or type	Pedigree (i.e., stallions entered or accepted for entry in the recognized Stud Book of their breed)			Non-Pedigree (i.e., stallions not entered or accepted for entry in a recognized Stud Book)			Totals of each breed or type (pedigree and non-pedigree)		
	Applications	Licensed	Refused	Applications	Licensed	Refused	Applications	Licensed	Refused
HEAVY									
Clydesdale ..	156	153	3	31	31	—	187	184	3
Percheron ..	77	76	1	5	4	1	82	80	2
Shire ..	944	922	22	164	152	12	1,108	1,074	34
Suffolk ..	208	202	6	8	8	—	216	210	6
Others ..	—	—	—	71	68	3	71	68	3
LIGHT									
Arab ..	8	8	—	2	2	—	10	10	—
Cleveland Bay ..	3	3	—	—	—	—	3	3	—
Hackney ..	11	11	—	6	6	—	17	17	—
Hunter ..	2	2	—	4	4	—	6	6	—
Thoroughbred ..	164	161	3	2	2	—	166	163	3
Others ..	—	—	—	4	4	—	4	4	—
PONY AND COB									
Dales ..	10	10	—	5	5	—	15	15	—
Fell ..	7	7	—	2	2	—	9	9	—
Highland ..	1	1	—	—	—	—	1	1	—
Polo and Riding	8	8	—	2	2	—	10	10	—
Shetland ..	2	2	—	—	—	—	2	2	—
Welsh ..	8	8	—	1	1	—	9	9	—
Welsh Cob ..	18	17	1	11	11	—	29	28	1
Totals	1,627	1,591	36	318	302	16	1,945	1,893	52

MARKETING NOTES

Milk Marketing Scheme: Pool Prices for November, 1935.—The wholesale contract price for November, 1935, was 1s. 5d. per gal. in all regions. Pool prices and rates of producer-retailers' contributions are given below, with comparative figures for October, 1935, and November, 1934 :—

Region.	Pool Prices (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	Nov. 1935	Oct. 1935	Nov. 1934	Nov. 1935	Oct. 1935	Nov. 1934
Northern ..	13½	13½	14	3½ ₁₆	3½	2
North-Western ..	13½	13½	14	3½ ₁₆	3½	2
Eastern ..	13½	13½	14½	2½ ₁₆	2½ ₁₆	1½
East Midland ..	13½	13½	14	3½	3½	2
West Midland ..	13	13	13	3½	3½	3
North Wales ..	13	13½	13½	3½	3½ ₁₆	2½
South Wales ..	13½	13½	14	3½	3½	2
Southern ..	13½	13½	14½	2½ ₁₆	2½ ₁₆	1½
Mid-Western ..	13	13	13	3½	3½	3
Far-Western ..	13	13	13	3½	3½	3
South-Eastern ..	14	14	14½	2½	2½	1½
Unweighted Average	13·36	13·43	13·80	3·23	3·18	2·20

These prices are exclusive of the premiums for level deliveries and for special services. In addition, accredited producers received or were credited with a premium of 1d. per gal. The sum required for this purpose was raised by a levy of ·254d. per gal. A levy of ¼d. per gal. was made for general expenses.

Sales on wholesale contracts were as follows :—

	Nov. 1935 <i>Estimated</i>	Nov. 1934
Liquid	45,594,413	44,382,665
Manufacturing	19,259,058	15,901,569
Percentage Liquid Sales ..	70·3	73·6
Percentage Manufacturing Sales	29·7	26·4

The average realization price of manufacturing milk during November was 5·80d. per gal compared with 6·27d. per gal. for November, 1934. Farmhouse cheesemakers manufactured 516,502 gal. into cheese, compared with 1,400,136 gal. in October, and 305,869 gal. in November, 1934.

MARKETING NOTES

Committee of Investigation for England.—Mr. James Whitehead, K.C., has agreed to accept appointment as Chairman of this Committee for the purpose of the inquiry into the complaints against the operation of the Milk Marketing Scheme which have been made by the Central Milk Distributive Committee and the Parliamentary Committee of the Co-operative Congress. The hearing of these complaints was resumed on December 19.

Potato Marketing Scheme: Riddle Regulations.—The Potato Marketing Board cancelled on November 28 the regulations made on August 23 imposing a minimum riddle of $1\frac{5}{8}$ in. The basic minimum riddle of $1\frac{1}{2}$ in. prescribed by the Scheme automatically comes into force and remains in force until a further determination of the Board.

Drying Surplus Potatoes for Cattle Food.—The factory erected at Wisbech by the Farmer's Marketing and Supply Co., Ltd., for the manufacture of cattle food, was opened officially on December 12. Supplies of potatoes are being obtained on contract at £1 per ton delivered at the factory.

Hops Marketing Scheme.—The Hops Marketing Board proposes to make a further payment to growers immediately the valuation is completed. This payment will bring the advances made to growers up to two-thirds of the gross value of their quota hops, based on estimated weights of $1\frac{1}{2}$ cwt. per pocket.

Bacon Development Board: Curers' Licences.—The Bacon Development Board have issued a note of the conditions to be attached to licences granted by the Board in respect of premises used for the production of bacon. Each licence which will relate to specified premises will, unless revoked, remain in force until December 31, 1936, when it will be renewed, with or without alterations in the conditions, for a further year except in a case where the holder has been notified to the contrary at least two months previously. If the Board shall subsequently determine the quantity and/or description of bacon which may be sold by the licence holder, the licence shall permit only such quantity and/or description to be produced, provided notice of the determination has been given to the holder.

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If the licence holder is a registered producer of bacon under the Bacon Marketing Scheme, the licence will permit the production of bacon only from pigs purchased under contract from a registered producer of pigs or from the Pigs Marketing Board or otherwise as provided in paragraph 37 of the Bacon Marketing Scheme. If he is not a registered producer, the licence will permit the production of bacon up to the amount of estimates submitted on demand to the Board but not exceeding 40 cwt. in any consecutive two months.

Pigs and Bacon Marketing Schemes : *Amendments of the Pigs' Marketing Scheme.*—The draft amendments of the Pigs Marketing Scheme, as modified by the Minister and the Secretary of State for Scotland, were approved by the House of Commons on December 17, 1935 and by the House of Lords on December 18, 1935. An Order* bringing the amendments into force was issued on December 20, 1935.

The amendments are designed to improve the working of the Scheme in the light of the experience gained in the past two years, particularly as regards the procedure for the election of members. The new electoral machinery, which will operate for the 1937 elections, provides that the Board shall advertise the date of the election at least eight weeks before it takes place, and fix a time, being not less than six weeks before the election, by which nominations of candidates must be received in the Board's office. Formal notice of the election meeting, together with a list of the candidates duly nominated, will be sent to every registered producer entitled to vote, not later than twenty-one days before the meeting.

Pig Prices for December.—The price of the basic pig (i.e., Class I, Grade C) fell from 11s. 4d. per score in November to 10s. 2d. in December. The latter price was the same as that for October. There was no change in the cost of the feeding stuffs ration, and the drop in pig prices was due to the fall in the ascertained bacon price from 90s. 3d. to 82s. 5d. per cwt.

Bacon-Pig Contracts for 1936.—The Pigs' Marketing Board announced on December 6 that whilst at that date the total number of pigs secured under the

* Pigs Marketing Scheme (Amendment) Order, 1935.

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two forms of contract for 1936 totalled slightly over 2,000,000, a number of curers had not obtained sufficient direct contract supplies to ensure an economic throughput, and the number of pigs contracted for with the Board was not sufficient to make up these deficiencies. The Board therefore decided to issue a further contract to enable them to secure additional supplies for such curers. This new contract is similar in terms to the previous contract between producers and the Board for 1936, except that (1) the producer need not contract to supply a minimum of 25 per cent. in the first four months, and (2) the extra payment to producers under this contract is 1s. 6d. per pig.

Bacon Imports.—In view of the present uncertainty regarding the contract position and the volume of home bacon supplies, it has been decided that the foreign quota shall continue for the first six weeks of 1936 at the rate in force for the last quarter of 1935.

Supplies and Prices of Early Potatoes in 1935:
Imported Supplies.—Imports of early potatoes from foreign countries and the Irish Free State were regulated by Order for the first time in 1935. The system of regulation introduced under the provisions of the Potato (Import Regulation) Order, 1934, was described in the December, 1934, issue of this JOURNAL (pages 894-7). It was there stated that it might be necessary to make arrangements to ensure that total permitted imports of early potatoes should be obtained from exporting countries in prescribed proportions. It was subsequently decided, however, to adopt for imports of early potatoes from foreign countries and the Irish Free State the same method as has been followed for maincrop potatoes, namely to leave importers free to obtain supplies, within the limit of their allocations, from any available source. A global quota of 90,000 tons was fixed for the whole season, from February to August. Of this total, 80 per cent. (72,000 tons) was allotted to the period up to the end of May, in order to ensure that the bulk of foreign imports should be put on the market before home-produced supplies would normally have been available in quantity. An additional allocation of 2,500 tons was made for the exclusive use of the "crisp" trade in July and August. Total imports under licence during

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the season amounted to 90,400 tons as compared with 77,250 tons in 1934 and 93,300 tons in 1933.

Imports from Empire sources other than the Irish Free State were not subject to regulation. They are practically wholly derived from the Channel Islands, supplies from which showed a considerable increase in the past season.

Total imports of early potatoes in the past three seasons have been as follows :—

	1933 <i>Tons</i>	1934 <i>Tons</i>	1935 <i>Tons</i>
Foreign countries and Irish			
Free State	93,300	77,250	90,400
Channel Islands	69,500	65,140	85,300
Other Empire countries ..	1,400	1,500	1,300
Total	164,200	143,890	177,000

The most important sources of supply are the Channel Islands, and Spain and the Canary Islands. In 1935, the Channel Islands supplied 48 per cent. of our total imports and Spain and the Canaries 45 per cent., as compared with 45 per cent. and 46 per cent. respectively in 1934 and 42 per cent. and 48 per cent. in 1933.

Home Supplies.—The area under first and second earlies in Great Britain in the past season (according to the Potato Marketing Board's returns of holdings of one acre or more) totalled 107,775 acres as compared with 125,359 acres in the previous season. Apart from the reduction in the crop due to the smaller acreage, the severe frosts in the third week in May were responsible for some diminution in the yield. The main effect of the late frosts, however, was to delay the marketing of first earlies by about three weeks, with the result that there was a marked shortage of home supplies in the latter part of June, followed by some congestion owing to the marketing of first earlies at the same time as second earlies. This situation was met in part by adjusting the import quota so as to bring forward into the first fortnight of July supplies that would not normally have been available until the latter part of July and the month of August. The gap in the market was mainly filled, however, by heavily increased imports from the Channel Islands, which

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were over 18,000 tons greater in July than in the corresponding month of the previous year.

Prices.—Prices of imported supplies in the early part of the season were similar to those ruling in 1934, but they underwent violent fluctuations in June and July. With the decline in Spanish arrivals and the delay in the marketing of the home crop there was a sharp rise in prices up to June 20. In the following weeks, imports from the Channel Islands were heavy and prices declined rapidly to about the level of 1934. Prices of home-grown earlies were at first appreciably higher than in the previous year, but fell sharply in the latter part of July to about the 1934 level owing to the overlapping of first and second earlies on the market. The following table shows the seasonal average wholesale price per hundredweight of first and second quality new potatoes at large town markets in the past three seasons :—

<i>Variety.</i>	1933	1934	1935*
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Jersey (average price in June) ..	13 0	14 3	19 3
Spanish	14 9	18 6	20 0
English { Duke of York	7 6	9 0	8 3
{ Epicure	5 0	7 0	6 3
{ Sharpe's Express	6 9	8 6	9 0

* Provisional figures.

The Potato Importers' Association, Ltd.—The constitution and functions of the Potato Importers' Association in connexion with the administration of the Potato (Import Regulation) Order, 1934, were described in the December, 1934, issue of this JOURNAL (p. 896). In the first Annual Report issued to members at the beginning of November, 1935, the Council of the Association indicate that the year's working has been remarkably smooth and successful, considering that the Association has been developed without the guidance of precedent. The membership of the Association exceeds 500.

The following is an extract from the Report :—

Under the arrangements with the Government Departments concerned, every applicant for membership has been required to furnish returns certified by qualified accountants, setting out his imports of potatoes over the preceding three years, and if an applicant cannot

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produce such evidence his application has been suspended until he has produced satisfactory evidence that he is actually importing potatoes in his own name under the provisions as to New Importers. The whole of these returns have been very carefully scrutinized, and, where necessary, additional confirmation and verification have been obtained.

Practically the whole of the regular importers of potatoes have applied for registration through the Association, but the few firms who have elected to apply direct to the Board of Trade have been required to make exactly the same returns as are supplied to the Association by its members.

Under the system of quantitative control of potato imports set up by the Government, the tonnage which may be imported in any period is settled by the Board of Trade on the recommendation of the Market Supply Committee, after that Committee has considered the views expressed at the Potato Supplies Consultative Committee, on which there are representatives of all the Government Departments concerned, and of the Potato Marketing Board, this Association, the wholesale and retail traders, and the Co-operative Congress.

The Board of Trade then advises the Association of the quantity for which Certificates may be issued to its members over the stated period, and the method of calculating the proportion of the figure which shall be allotted to each firm is agreed with the Board of Trade, and applies equally to Association members and to those firms applying direct to the Board of Trade.

This system involves much work in ascertaining the qualifying tonnage of each firm for the period, and calculating the allotment therefrom, but it does ensure an equitable distribution of the permitted imports among all importers, based upon their previous imports. A small proportion of the global figure is reserved for allotment to New Importers, the tonnage allotted to each being fixed in relation to the total reserved.

In view of the importance of these calculations, your Council decided that, in addition to auditing the financial accounts of the Association, the Auditors should also check the whole of the allotment figures, so that there may be no doubt that every member is treated on a fair and equitable basis.

The figures of individual members are known only to the staff and the Auditors, and are treated with the strictest confidence. Every member has been given a membership number, and any details which it may be necessary to disclose to the Council in connexion with allotments are dealt with under membership numbers.

Provision is also made under the scheme for members who cannot import the whole of the tonnage allotted to transfer part of their allotment to other members who require additional tonnage. Some firms have taken advantage of this provision, but the Council feels that much more use could be made of the transfer scheme. Members are reminded that all transfers should be registered with the Association immediately, so that the necessary adjustments can be made in the Association accounts.

During the period under review, 7,199 Certificates have been issued authorizing importation under the Association's quotas, and of this number 3,723 were issued in the month of May. This made the work in that month particularly arduous, and the machinery evolved to deal with the issue of Certificates was submitted to a severe test. As a result of the year's experience, certain adjustments to the machinery are being made, but your Council feels that on the whole they can

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claim that the work has proceeded with very few hitches, considering the complete lack of precedent on which to build up the necessary organization.

Milk Act, 1934.—Advances and payments made by the Ministry up to December 15, 1935, under this Act are as follows :—

(a) Advances in respect of manufacturing milk.

Section	Paid to	In respect of milk	Gallons	Amount
1	Milk Marketing Board for England and Wales.	Manufactured at factories other than the Board's.	273,169,639	£1,450,034
2	do.	Manufactured by the Board.	187,331	1,105
3	do.	Made into cheese on farms.	20,653,552	120,236
6	Government of Northern Ireland (by direction of the Treasury).	Used for butter and cream at registered creameries.	34,297,186	262,747
			Total ..	1,834,122

(b) Contributions under Section 11 towards the expenses of the Milk Marketing Board in carrying out approved arrangements for increasing the demand for milk.

(i) Milk-in-Schools Scheme (22,509,982 gallons) .. £398,502

(ii) Initial Publicity for Milk-in-Schools Scheme .. 2,000

£400,502

Cheese Milk Price.—For the purpose of Exchequer advances under the first three sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4·36*d.* per lb. for the month of December.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by December 15, 1935, to £4,673,876. These payments were in respect of 1,967,862 animals, the average payment per beast being £2 7*s.* 6*d.* Some 597,000 imported

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animals have been marked at ports (excluding Northern Ireland) since August 6, 1934, under the Marking of Imported Cattle Order.

Amendment of Marking Order.—The Cattle Industry (Marking of Imported Cattle) Order, 1934, was amended by an Order, made on November 12, 1935, the main purpose of which is to facilitate administration. As from November 18, the new Order required the marking on arrival in the United Kingdom of cows in milk, and cows and heifers in an advanced state of pregnancy, and exempted from marking cows that have grown more than six permanent incisor teeth.

Wheat Act, 1932: *Sales of Home-grown Wheat—Cereal Year 1935-36*—Certificates lodged with the Wheat Commission by registered growers during the period August 1 to December 13, 1935, cover sales of 15,954,783 cwt. of millable wheat as compared with 16,009,877 cwt. in the corresponding period (to December 14) in the cereal year 1934-35.

Sales of British Wheat in the first 14 weeks of the Cereal Year 1935-36.—The Wheat Commission state that according to calculations based on wheat certificates received from registered growers, the total quantity of British Wheat (including seed corn) marketed in the first 14 weeks of the current cereal year was approximately 13,920,000 cwt. (41·5 per cent.) in relation to the estimated United Kingdom wheat crop of 33,580,000 cwt. This compares with 36·2 per cent. and 34·4 per cent. in the same period in 1934 and 1933 respectively.

First Advance Payment to Registered Growers for 1935-36.—The Wheat Commission made an advance payment to 52,995 registered growers on November 30 at the rate of 2s. 9d. per cwt. (12s. 4½d. per quarter) in respect of 11,558,300 cwts. (2,568,500 qrs.) of wheat vouched for by 70,788 wheat certificates delivered to the Commission between August 1 and November 1, 1935. The total amount involved was approximately £1,589,300. Any balance due on these certificates will be paid in September, 1936.

The Commission hope to make three further advances during the cereal year at dates to be announced.

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Cut and Kibbled Wheat.—Following upon the issue of their Circular Letter of March 22, 1935, to quota-paying and provender millers regarding the definition of meal for the purposes of the Wheat Act, the Wheat Commission have had under consideration the existing trade in cut and kibbled wheat delivered by millers to persons who mix the cut and kibbled wheat in chick feeds for sale to poultry keepers.

The Commission will be satisfied that cut or kibbled wheat has been delivered by a miller for consumption, *without further manufacture*, as animal or poultry food, if the miller satisfies the Commission that the cut or kibbled wheat, free from reduced meal, was delivered to a farmer or poultry keeper for consumption by his stock, *either* as unmixed cut or kibbled wheat *or* mixed (whether by the miller or by some other person) only with other dry non-flour substances in an uncooked chick feed.

The reduced product removed by aspiration and/or sieving in the milling of cut or kibbled wheat will be regarded by the Commission as meal for the purposes of the Wheat Act. For this product, the miller will be subject to the same conditions as set out in paragraph 3 of the Circular Letter of March 22, 1935, for exemption from liability to quota payments as for all meal, other than cut or kibbled wheat, delivered by the miller for consumption or use by himself or by any other person.

Sugar-Beet : Production of Home-grown Beet Sugar during 1935-36 Campaign.—According to returns made by the beet sugar factories operating in Great Britain, the total quantities of beet sugar manufactured during November, 1935, and the corresponding month in 1934 were :—

			<i>White</i>	<i>Cwt. Raw</i>	<i>Total</i>
1935	..	..	1,470,236	1,665,380	3,135,616
1934	..	..	1,478,583	1,743,355	3,221,938

The total quantities of sugar produced to the end of November in each of the two manufacturing campaigns were :—

			<i>White</i>	<i>Cwt. Raw</i>	<i>Total</i>
Campaign	1935-36	..	2,785,948	3,332,151	6,118,099
"	1934-35	..	3,038,915	3,816,950	6,855,865

Eggs and Poultry : Report of the Reorganization Commission for Great Britain.—The Report of the Reorganization Commission for Eggs and Poultry for Great Britain* was published during December as one of the series of Orange Books on Agricultural Marketing.

The Commission was appointed jointly by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland on January 25, 1935. Mr. F. N. Blundell, who succeeded Dr. Addison as Chairman of the England and Wales Commission, was Chairman. The other Members were Major Sprot of Riddell, who had been Chairman of the Scottish Commission, Mr. J. Prentice, a former member of that body, and Mrs. Lindsey K. Huxley and Mr. A. F. Forbes, two of the former members of the English Commission. The function of the Commission was to inquire how the operation of the schemes for regulating the marketing of eggs and poultry prepared by the two previous Commissions could be facilitated by measures affecting imports of eggs and poultry and other poultry products, and by co-operation between the proposed marketing boards and any corresponding body in Northern Ireland.

The Report begins with a survey of supplies and prices of eggs and poultry in the United Kingdom and a discussion of the influences that have affected the volume of imports during the last few years. It is shown that since 1930 imports have been discouraged by the fall in price levels, the decline in the value of sterling and the imposition of import duties. The original duties of 10 per cent. *ad valorem* on foreign eggs were replaced, as a result of the Ottawa agreements, by specific duties ranging from 1s. to 1s. 9d. per 120, which are now equivalent to an average of some 20 per cent. *ad valorem*. Irish Free State imports are subject to special rates of duty, but eggs from all other parts of the Empire enter duty free. To some extent the effect of the duties has been overcome by systems of export bounties and in other ways, and the Commission express the opinion that the existing rates of duty are

* Eggs and Poultry : Report of the Reorganization Commission for Great Britain. Published by H.M. Stationery Office as Economic Series No. 43, price 1s., post free 1s. 2d.

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unlikely at present to reduce imports below the current levels.

The Commission consider that the poultry industry should be encouraged and assisted to expand, because increased production can be suitably undertaken in this country, particularly on small holdings, and because demand may be expected to increase. They show that additional protection to the home industry is likely to lead in the long run to further expansion of production rather than to permanently increased unit profitability. The interests of consumers and of international trade must, however, be considered, and expansion should not, in any case, be so rapid as to accentuate the already difficult position in respect of laying stock.

After examination of the various forms that import policy for eggs and poultry might take, the Commission reach the conclusion that the general principle of import duties is the most appropriate for application in this particular case. They accordingly recommend for consideration that, in due course, the present duties on foreign eggs shall be raised by 6*d.* per 120 and that a duty of 6*d.* per 120 shall be placed upon Empire imports, thus maintaining the existing margin of Empire preference.

The Commission do not recommend any immediate increase in the duties on egg products, but on this point Mr. Prentice makes a reservation which is referred to later. The Report states that there is at present no commercial manufacture of liquid eggs and other egg products in this country, and that manufacture is unlikely to become an attractive proposition until substantially the whole demand for eggs in shell has been met from home sources. Imported egg products are used almost entirely in the baking and confectionery industries, and competition with home-produced shell eggs is negligible. The Commission's view is, therefore, that any immediate increase in the duty would injuriously affect these manufacturing interests without conferring any benefit upon the home industry. If, later on, home-produced second-quality eggs should need protection in the manufacturing market, they should receive the same measure of preference as in the shell egg market.

Because of the possibility that import duties may be

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overridden, the Commission recommend that the increases in duties should be supplemented by direct financial assistance to the home industry. They propose that 25 per cent. of the yield from the duties upon eggs and egg products, which, it is estimated, will produce some £340,000 per annum, should be earmarked for the assistance of the home industry. Both the rates of duty and the percentage to be allocated to the industry should be subject to review after three years. The administration of the fund thus provided should be in the hands of a permanent Commission of three independent persons to be appointed jointly by the Minister of Agriculture and Fisheries, the Secretary of State for Scotland, and the Secretary of State for Home Affairs. It is suggested that the money should normally be used in development and efficiency services, but that during the early years of the marketing schemes, some part of it might be employed in meeting the initial expenses.

The Commission recommend that if the storage of eggs is undertaken by the home marketing Boards in the spring, imports should be regulated quantitatively during the period of storage. They propose that the permanent Commission shall be the body responsible for administering certain features of the policy of seasonal quantitative control. They further suggest that the permanent Commission, in co-operation with the Customs, should arrange to furnish the marketing Boards with information as to current imports in order to assist in the determination of prices. The Market Supply Committee should continue to keep the general market situation under review and should advise the Government if any further measure of quantitative regulation is necessary owing to an undue increase in imports brought about by external conditions.

The Commission consider that the existing duty of 3*d.* per lb. on imported table poultry, including turkeys, offers a sufficient margin of preference to the home industry, and they therefore recommend no increase in this duty.

The problem of co-ordination between marketing Boards in England and Scotland and any marketing authority in Northern Ireland is examined in some detail. The Commission are of opinion that there

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should be separate marketing schemes in England and Wales and in Scotland, but that close co-ordination between the marketing Boards and Northern Ireland is essential. They propose that a Co-ordinating Committee should be set up, consisting of five representatives of the English Board, two of the Scottish Board, and two of Northern Ireland, together with the three members of the permanent Commission. They recommend that the marketing schemes for England and Wales and for Scotland should be amended to require the Boards to consult this Co-ordinating Committee in regard to spring storage and grading; and they express the hope that the Co-ordinating Committee will be consulted on all other matters of common interest.

The marking of imported cold-stored eggs with an indication that they have been cold-stored was discussed at some length in the Report of the England and Wales Commission and was recommended by both the earlier Commissions. The present Commission content themselves with endorsing this recommendation.

The Report concludes with a statement of the Commission's view—which is expressed also in an earlier Chapter—that improvements in marketing methods are likely to be more potent than measures of import control in stimulating the healthy development of the home industry, and that their recommendations as to import policy are intended to supplement and to assist the reorganization of home marketing, not to avoid the need for it.

In a short reservation, Mr. Prentice expresses his agreement with the main recommendations of his colleagues, but dissents from their view that there should be no alteration at present in the duty on egg products. He regards liquid eggs as being competitive with home-produced shell eggs, more especially among the smaller bakers in the provinces. He recommends that the duty upon frozen liquid eggs should be raised from $\frac{1}{2}d.$ to $1\frac{1}{2}d.$ per lb., with corresponding increases for other forms of egg products.

National Mark Creamery Butter.—Butter-making on the farm used to be a popular method for the disposal of milk from hill farms and from farms remote from industrial centres where stock-breeding was

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carried on, the separated milk being valuable for the rearing of young stock.

The Census of Production showed that in 1930-31 35,138 tons of butter (equivalent to 185·6 million gal. of milk) were made on farms in Great Britain. At that time butter-making under factory conditions was of much less importance than farmhouse butter-making, a few creameries in the south-western counties manufacturing the bulk of the factory butter produced in this country. The advent of the Milk Marketing Board and the improved facilities offered to purchasers of milk for butter-making considerably altered the position. In the year 1933-4, the Milk Marketing Board paid manufacturing rebates on 41·3 million gal. of milk manufactured into butter, and for the year 1934-5 the corresponding quantity was approximately 83·7 million gal. From these figures, it will be apparent that the creamery butter industry has become a significant factor in the disposal of manufacturing milk in this country, while there is evidence that over the corresponding period farm butter-making has considerably declined.

With such a large increase in production, it was perhaps to be expected that some manufacturers, lacking the experience of overseas butter-makers, would find difficulty at first in offering a uniformly high-quality butter that would compete with the best imported product. The National Mark Creamery Butter Scheme was introduced at an opportune moment, and has been of service by setting a seal of quality on the best home-produced factory butter, thus enabling distributor and consumer alike to buy the product with confidence.

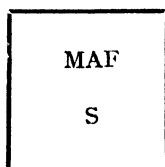
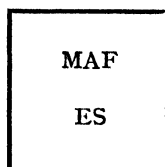
National Mark Cheddar Cheese Scheme.—A meeting of manufacturers and farm-makers of Cheddar cheese was held at the Somerset Farm Institute, Cannington, on November 13, 1935, when the Ministry was requested to take steps to introduce the National Mark Cheddar Cheese Scheme as soon as possible.

The meeting approved, in general, the provisions of the scheme, and constituted a Grading Committee, whose duties will involve the appointment of an official to grade to statutory standards the output of Cheddar

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cheese made by authorized manufacturers and farm-makers and the making of arrangements for the remuneration of the grader from the grading fees collected from the makers in respect of cheese submitted for grading. The Dairying Superintendent of the Somerset County Council will be available to assist the Committee in an advisory capacity.

The first meeting of the Cheese Grading Committee was held at Bristol on November 25, when an official grader was appointed. The scale of grading charges and the method of applying the Grader's mark and the National Mark to Cheddar cheese were also considered. The designs recommended for the grader's marks for "Extra Selected" and "Selected" Cheddar were as follows:—



the marks to be not larger than 2 in. square. The Grading Committee recommended that in the first instance the method of applying the National Mark should be by means of rubber stamps.

Marketing Demonstrations.—The Ministry is staging a display of National Mark dairy produce, eggs, honey and canned fruits and vegetables, at the National Dairy and Ice Cream Convention to be held at the Crystal Palace on January 28-31.

Germany: The Pig Situation.*—It is reported that as a result of trade agreements with several countries an additional quantity of about 170,000 pig carcasses will be imported into Germany before the end of the year. The whole quantity, it is stated, can be paid for in the course of the normal exchange of goods so that no expenditure of foreign currency will be necessary. A recent report of the Reich Food Estate points out that prior to the recent shortage, the weekly import of pigs amounted to about 1,000. In subsequent weeks this figure was increased to 5,000 head. Under the new arrangements about 30,000 pigs a week will be imported into Germany. Even this increase in pig supplies may not overcome all the difficulties, and complete recovery will have to await the re-establishment of a normal pig population in Germany. Expert forecasts suggest that by the middle of February next the number of pigs will be the same as a year previously.

* Note by the Market Supply Committee.

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In the meantime the pig marketing regulations have been tightened up. The slaughtering quota originally fixed for October at 80 per cent. of the slaughterings in the corresponding month of 1934 was later reduced to 70 per cent. in the hope that stocks of pork, previously held back, would be released. Deliveries on the wholesale markets at first improved but failed to come up to expectations. The reason advanced for this is the approach of the season for home slaughterings, on which the farmers this year will hardly exercise any restrictions, and the considerable increase in private slaughterings in country districts. The slaughtering quota was further reduced in November to 60 per cent. and it is hoped that the provision of supplies in town and country will be levelled up, as it is thought that the demand from country districts for market pigs will decline as soon as the home slaughterings begin.

A new order prohibits the slaughter of immature pigs. In future, pigs under 180 metric pounds (198 lb.) in large towns and pigs under 190 metric pounds (209 lb.) in the country must not be slaughtered. At first, it was sought to make this order unnecessary by a sharp discrimination of maximum prices for various weight classes, but apparently this was not considered a sufficient incentive to stop the slaughtering of young and immature animals. Naturally, the new order will mean at first a further restriction of deliveries, which has been taken into account in fixing the 60 per cent. reduction in the quota.

Bread Cereals.—The situation in regard to bread cereals appears to be satisfactory, according to a report published by the Reich Food Estate showing supplies on October 31 last. Total stocks of rye amounted to 6.15 million short tons, or 380,000 short tons more than a year ago. In the case of wheat, stocks aggregated 4.4 million short tons, or about 80,000 tons more than a year ago. Thus total stocks of rye and wheat aggregate nearly 10.6 million short tons, or 460,000 short tons more than on October 31, 1934. The report adds that during the current year to date, consumption is lower than last year.

Milk.—A new decree which empowers the Reich Food Estate to regulate the recording of milk production is considered to be an important step in the direction of increasing milk production. The attainment of an improved milk production has already been attempted in many parts of Germany on a voluntary basis by means of recording output. To this end, "recording associations" were set up and, in some instances, the creameries themselves undertook this task. These efforts demonstrated that thorough-going results could only be achieved if those producers who had hitherto not collaborated could be induced to do so. Milk producers are now compelled to avail themselves of milk recording institutes, and where possible, to collaborate with such institutes as are already in existence. It is not proposed to institute immediately a recording system for the whole country, but to do this by districts at convenient intervals.

Netherlands : Restriction of Milk Production.*—The scheme for controlling the production of milk by restricting the subsidy payable to an amount bearing a specified proportion to the production in the two previous calendar years was first intended to come into operation on June 1, 1935. The date was later postponed till the end of the year. In the meantime the Central Agricultural Association and the Co-operative Dairy Association have represented to the Minister of

* Note by the Market Supply Committee.

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Agriculture and Fisheries that the scheme is not practicable. As the co-operation of these bodies is essential to the plan, the Minister has been compelled, reluctantly, to withdraw the measure and the proposed modification of the milk subsidy will not now be put into effect. In its place a further slaughtering of cattle, with a view to reducing the supply of milk, is reported to be in contemplation. It is doubtful, however, states the "Vaderland," whether the Agricultural Crisis Fund is in a position to purchase the 100,000 head of cattle which it is proposed to slaughter.

In this connexion the following figures of an official estimate of the cattle population made on June 1 last are of interest. Comparative figures for earlier years are also given:—

NETHERLANDS : CATTLE POPULATION.

	1930	1933	1934	1935
	000's	000's	000's	000's
All Cattle.. ..	2,367	2,877	2,827	2,639
of which :				
Milch cows	1,298	1,451	1,433	1,434
Young stock :				
Over 1 year ..	419	611	673	533
Under 1 year ..	502	612	459	399

Denmark : Pig Meat.*—As a result of a recent discussion between the Minister of Agriculture and the butchers, it was decided that, as a temporary measure for increasing the supply of pig-meat, the sale of pigs in addition to the contract numbers should be allowed at increased prices. Pigs, for which producers have a card, can be sold at the official price of the day (which is normally more than double the price which butchers pay for pigs in respect of which there is no card). The meeting agreed to raise the price for pigs sold without a card from 70 to 95 øre per kg. (i.e., from about 3½d. to 5d. per lb.). In this way farmers would get about 15 kroner (nearly 13s. 6d.) more for each pig sold without a card, and it is hoped that this may be an incentive to greater deliveries. On the basis of the pig census it seems likely that in a few months deliveries and slaughterings will be greater. Now that producers see their way to getting a higher price—and the increased price only holds until the new year—it is probable that they will push forward with fattening so that more pigs can be put on the market in the next few weeks than had been expected.

United States of America : Creation of an Organization for the Disposal of Surplus Agricultural Produce.*—The Department of Agriculture set up in the middle of November, 1935, a body called "The Federal Surplus Commodities Corporation." This new authority is the successor of the "Federal Surplus Relief Corporation," but its sphere of activity is somewhat different. The earlier body attempted to dispose of surplus agricultural produce to needy persons; in other words, it attempted to marry agricultural relief and poor relief. The new organization will dispose of the surpluses on a commercial basis.

The principal surpluses which the Federal Surplus Commodities Corporation will attempt to dispose of in the first place are as follows:—

Cattle Hides	1·5 million
Calf Skins	5·5 million
Beef in tins	200 million lb.

These surpluses were taken over from the Federal Surplus Relief Corporation.

* Note by the Market Supply Committee.

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As regards the methods of disposal, nothing is yet known, but the authorities are basing their proposals upon powers contained in the new Agricultural Adjustment Act of 1935, which provides that 30 per cent. of the revenue from customs duties may be utilized for subsidizing the export of surplus agricultural products. Above all, cotton, tobacco and fruit enter into the question. About 100 million dollars annually will be available to the authorities from the customs duties, and, in addition, funds will be available from the Agricultural Processing Taxes. The possibilities of financing the export trade are not overestimated since it is realized that political factors will prove a severe handicap.

JANUARY ON THE FARM

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Retrospect.—In reviewing the past year on the farm, the dry summer stands out as a prominent feature, with the crops, in consequence, maturing early. Up to the end of October, the local rainfall was 35 in. in 1935 compared with 31 in. in 1934, and 25 in 1933; up to the end of August, however, the rainfall in the past year was 1 in. less than up to the same period in 1934, but 1 in. more than in 1933. The completion of the corn harvest before the end of August is an unusual event in this district, but, on the farm attached to this College, it has occurred in each of the last three years. Harvesting was completed by August 14 in 1933, by August 25 in 1934, and by August 27 in 1935. The oat is the only cereal grown on this farms.

A discussion arose recently as to whether the past year was an earlier season than 1934. Opinion at "The Bull" strongly supported the view that 1935 was the later of the two until the first half of July, but that "it caught up" after that, leading to a more sudden ripening of corn than in the preceding harvest. The dates of ripening of farm crops do not necessarily form an accurate index of earliness, because of the variation in dates of sowing, soil conditions, etc. The flowering dates of certain perennial wild plants are a better indication, because they are in the ground ready to react to the effects of the season. The Wild Dog Rose flowered on June 19 in 1935, one day earlier than in 1934. The Devil's-bit Scabious, however, flowering in the same plot on August 10, was three days later than the same plant in 1934. This suggests that the past two years were almost of the same earliness up to the middle of June, but that, by August, 1935, was a little later than the preceding year.

Science or no science, the general opinion was that the continued dry weather, with the water supplies at a very low ebb, caused a sudden "unnatural" ripening of the corn crops. This was responsible for an un-

healthy colouring of the standing crop, and, when threshing day came, the yields were disappointing.

The grazing season was satisfactory, until late summer; graziers consider that fattening animals have done better than for some years. In a discussion on this subject early in November, the opinion was put forward that the reason why cattle thrive so well in the past season was that the three consecutive dry years have reduced liver-fluke infestation to a minimum; it was considered that, in a normal year, cattle may carry flukes just sufficient in number to reduce their thriftiness a little, but not sufficient to cause noticeable damage. A veterinary research worker, however, considers the explanation highly improbable. While at the local abattoir, I discussed this point, and an official who was slaughtering and inspecting carcasses for the Jewish population, volunteered the information that, while doing similar work previous to this year at the Birkenhead lairages, he had observed that a large proportion of the Irish cattle had bad livers, but the carcasses seemed none the worse for it.

Sheep and lambs have done well, both on the better pastures and on the mountain grazings. The rainfall in spring was not heavy, but was timely, and there was just sufficient to keep going a supply of good grass. A shepherd, over 60 years of age, after getting the ewes down from the mountain at the end of October, remarked that he never remembered the ewes to look so well after their summer on the high land. As regards fat lambs, the prolific crop provided drafts for the butcher at an early date, and the rate of clearance was good throughout the season.

To the true farmer, there is an immense satisfaction in the harvesting of fine crops and the sight of thriving stock, which, apart from more sordid considerations, are a sheer joy in themselves. In these anxious times, however, financial questions cannot be long kept in the background, and, taking stock of the situation, they come right to the very forefront. The recently issued index numbers for the last six harvest years (September to August) afford means of a rapid comparison of different branches of the farm and of summing up the general situation. The general index of 115 (121 if the wheat and cattle subsidies are taken into account)

shows a slight improvement as compared with the previous year (113 and 117 respectively), and a still more substantial increase over the disastrous year 1932-3, when the figures were 106 and 110. An examination of the individual items would occupy too much space, but the facts may be commended to all farmers, who can see the trend of prices at a glance. It is sufficient here to say that milk has increased the lead that it has held for several years over nearly all other commodities. Sheep have recovered most of the ground they lost in 1931; potatoes, again, may be considered a paying crop; and even wool, which, four years ago, gave less than half pre-war values, has climbed some way up the road to pre-war level.

On the other hand, for the past month or two, the chief topic of conversation has been the low price of beef; but, writing from a district which is traditionally one of the most important rearing districts in Great Britain, one may be pardoned for calling attention to the still more serious plight of store cattle. Including the subsidy, fat cattle have at least made pre-war values; the same cannot be said for store cattle. An examination of the index figures month by month since the subsidy was introduced shows that only in one or two months has the figure for stores reached the same level as that for fat cattle, even without taking the subsidy into account. It is obvious, therefore, that, whatever happens to the subsidy, very little, if any, of it has drifted back to the rearer of store cattle.

To consider the relative position of the raiser and feeder in another light, we may, in summing up the situation of the latter, refer to Mercer's "Notes on Feeding Stuffs" for October last in this *Journal*, when he explained that, to arrive at a true profit or loss on fattening we cannot leave out the cost of replacing fat cattle by stores. That is, as long as stores are cheap, the feeder need not necessarily lose, because, eventually, it is the raiser who has to bear the brunt of the low prices. It is obvious that this situation, combined with the low price of butter and the relatively attractive prices obtainable for milk, is having a serious effect on the rearing of store cattle. A local dairy farmer, who keeps a good class of dual-purpose cows, stated recently that, until about 18 months ago, he had

a waiting list of purchasers for his bull calves for rearing at a price generally running from £2 to £3, and he never by any chance sent one of them to a market. Now, nearly all his calves have to be sent to a market to be sold for what they will make—often only a few shillings—to butchers or dealers.

Horses do not appear in the tables of index numbers, but even a summary of the year's events and trends would be incomplete without a reference to the improvement in the price of heavy horses. This was evident throughout the year, but the tendency became more pronounced at the autumn sales. Besides welcoming this from an economic standpoint, one cannot but feel glad that encouragement has been given to many excellent heavy horse breeders who have had to "mark time" for years. Apropos of the enthusiasm of the horse breeder, an agriculturist remarked the other day that, after listening to the conversation of some Shire enthusiasts, he was struck by the fact that even those who could only afford to keep one mare, often knew the location of practically every mare and foal worth knowing in two counties.

Ploughing Grass Land.—Except where the wet autumn has held up work on the stubbles, a start is made this month on the grass land. On farms heavily stocked with grass sheep, the ploughing of ley land is delayed as long as possible, and, except in the drier districts, is sometimes left until next month. This aspect of the question was emphasized by Faulder in a recent broadcast talk, when he expressed the opinion that it was the value attached to this extra grazing that prevented many in the north-western counties from taking greater advantage of the wheat subsidy.

After a spell of wet weather, ley land is ready for the plough some days before the other land; the turf and roots make for better natural drainage, and, if the land is in fairly narrow rigs or stetches, a proportion of the surface water will have run off.

The skim-coulter or skimmer plays an important part in the operation of ploughing a grass ley. In taking off from the furrow slice that portion of the turf which would otherwise be nearest the surface, and turning it into the hollow underneath, a double benefit accrues; grass is prevented from growing up between

the furrows, and, with less empty space under the furrow slices, a firmer and more drought-resistant seed bed follows. Even in areas of comparatively high rainfall, one cannot be too careful on the question of firm seed beds when ploughing up old pastures. An agriculturist who had to visit many farms in an official capacity in connexion with the ploughing campaign during the War, expressed the opinion that many of the crop failures for which wireworms were blamed were caused by ploughing pastures without using the skim-coulter; many who were then compelled to cultivate land had no corn drills, and, when seed is broadcast, the hollows under the furrows are even more serious in their effects.

For Young Farmers.—Ploughing matches are now taking place in different parts of the country. After the War, the tractor and the increased use of the digger plough diminished their popularity, and many contended that the slow rate of work, combined with the nature of the furrow left by the "match ploughs" had deprived such competitions of most of their value. There is now, however, a distinct revival of interest in these events; this can be seen in the increasing number of the competitions and in the good attendances. The recent successful competition at Bourton-on-the-Water, organized by the Gloucester County Council Education Committee in conjunction with a local society, was evidence of the popularity of these events. The cause of this increase in popularity is to be found, not only in the improvement of these competitions by including classes for tractor and digger ploughs, but also in the greater interest now taken in the men who work the soil. In the *Free State Journal of Agriculture* for 1935, J. O'Loan, in an interesting account of ploughing competitions, emphasizes the importance attached to such events in the Free State in helping to foster the "back to the land" spirit. A National Ploughing Association has been formed there, and a Cup is awarded by the Free State Ministry of Agriculture for inter-county competition. We should regard the ploughing match in the same light, thinking not so much of its direct utility, but considering it rather as a festival of people who love the soil—and the horse.

Young farmers can learn much by attempting to

judge the ploughing and seeing how their adjudication agrees with that of the judges. In the classes for "old-fashioned ploughs," which have long mould boards, the furrow aimed at is one suitable for the broadcasting of corn, i.e., the crested type, while in the digger classes, the flat rectangular type is produced, and must be judged accordingly. In addition to awarding points for the actual furrows, account is taken of the opening, or setting up, of the first furrows, and of the finishing.

In a recent discussion with enthusiasts who could recall great matches of a generation ago, I was surprised to find that it was not the ploughmen who came into their minds as the heroes, but the smith who had made the shares and, perhaps, the whole plough. Before the making of ploughs and plough parts became centralized in the factories, there was a double local interest in these competitions—the smith and the ploughman.

In many of the pre-war competitions, there used to be a prize for the most suitably dressed ploughman. This may, perhaps, seem a trivial side issue; however, we cannot but admire a good craftsman suitably attired for his work. The low-priced flannel trousers and mechanics' overalls have played havoc with the traditional mode of attire of land workers, and one cannot be exacting of men earning less than £2 a week. In these counties the general attire for farm work is very serviceable and picturesque, and consists mainly of a blue tight-fitting linen coat with brown corduroy trousers.

NOTES ON MANURING

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Fertilizers with the Seed.—In the March issue of this *Journal* Rayns and Sykes discussed some of the pros and cons of the practice of drilling fertilizers along with the seed. Some further experience of the method has been accumulated during the past season and it seems worth while to touch on the subject again.

One possibility is to mix seed and fertilizer intimately together and to sow the mixture by means of an ordinary single-hopper drill. From the mechanical point of view this has been found to work very well if the granules of fertilizer are of approximately the same size as the seeds. The new concentrated manures are of course supplied in granular form, and the size of granule is so nearly equal to that of a wheat or barley grain that a mixture of the fertilizer with either of these cereals can be sown without difficulty, and without risk that the ingredients will separate, in the drill hopper, to any appreciable extent. Moreover, in these cases farmers who have tried the method seem to have been favourably impressed with the results.

There are, indeed, theoretical reasons for expecting good results, at any rate as long as only light or moderate dressings of fertilizers are used. The plant food is placed within easy reach of the roots, and the method avoids the risk that the fertilizer will be fixed and held in the uppermost soil layer where, especially in dry seasons, root action is not active. Moreover, the roots of the crop should reach the manure before those of weeds, so that, in the important early stages of its growth, the crop should gain some advantage over its weed competitors.

There seem to have been very few controlled experiments on the point in this country, but one at least, carried out on a crop of barley near Oxford during the past season, supports the general opinion of farmers.

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The unmanured plots gave a yield of 26 bus. per acre. A dressing of 2 cwt. of concentrated fertilizer (C.C.F. No. 4) broadcast and harrowed in before drilling raised the yield to 35 bus., while the same fertilizer mixed with the seed gave fully 39 bus. per acre.

Speaking generally, the risk of the method is that the concentration of soluble matter in the immediate vicinity of the germinating seed may be too high—i.e., so high as to impede germination or even to “burn” the seedling. The amount of risk will depend on a number of factors, such as the solubility of the fertilizer, the amount applied per running yard of drill-row and the supply of moisture in the soil during the first few weeks after sowing. With wheat and barley, however, it seems very unlikely that harm would ever result, though it has been observed that the plants are sometimes a little slow in coming up. Mechanized corn farmers have, in fact, been using combined seed-and-manure drills for a number of years, and no harm to the crop seems to have resulted with dressings of concentrated fertilizers running up to 3 cwt. per acre.

Where ordinary single-hopper drills are used the drill setting must of course be adjusted to the larger total quantity of material to be sown, 1 cwt. of concentrated fertilizer being taken as approximately 1½ bushels.

With oats the plan is not quite so satisfactory as with barley and wheat, because the fertilizer granules, being smaller, rounder and relatively heavier than the oat grains, tend to sink to the bottom of the drill hopper, giving rise to unevenness in distribution.

With roots such as swedes, mangolds and sugar beet, there is a combination of factors all tending to increase the risk of damage to the young plants. For one thing the seedlings of some of these species are more easily damaged than cereals by highly concentrated solutions; also the soil is ordinarily rather dry at the time of sowing; the quantities of fertilizer are usually larger than for corn crops, and the wider spacing between the drills means, for any given application per acre, a much larger amount of fertilizer per yard of drill. For instance, a root crop sown in 24-inch rows with 4 cwt. of manure per acre would be getting about seven times as much fertilizer, per coulter per yard, as a corn crop

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sown in 7-inch rows with 2 cwt. of fertilizer. There is some evidence from New Zealand that the risk of damage to small seeds can be minimized by adding carbonate of lime to the mixture, but it would be unwise, pending further trials, to mix concentrated fertilizers with root and other small seeds. For wheat and barley the method can be recommended as both convenient and efficient.

The Rarer Soil Deficiencies.—It is usually assumed that the only elements likely to be deficient in our agricultural soils are nitrogen, potassium and phosphorus, and that these, along with lime, make up a "complete" inorganic fertilizer. While this is probably true in the main, an increasing number of instances have recently been found where the addition of some other element has improved the growth of the plant or the health of the stock feeding upon it, or both.

One or two instances may be quoted from overseas. Many of the soils in Central Alberta are deficient in sulphur, and the deficiency accounts for some rather startling results from fertilizer applications. "For instance, a moderate application of sulphate of ammonia, alone, on a seeding of timothy and clover, will usually promote the growth of the clover and depress that of the timothy." This is because clover has the higher sulphur requirement and because the sulphate radicle benefits the clover more than the ammonia helps the timothy. A disease of tea in Nyasaland is also attributed to sulphur deficiency. It is improbable that a like deficiency could arise in this country, if only because most of our soils are somewhat liberally soured with sulphuric acid derived from smoke. Moreover, large amounts of sulphur are applied in the ordinary routine, in the forms of superphosphate, sulphate of potash and sulphate of ammonia.

The peaty soils of the Everglades region of Florida are apparently deficient in copper, for applications of copper salts produce very marked increases in crop yields; "Sand-drown" of tobacco, occurring in several parts of the United States and also in Nyasaland, has been shown to be due to a shortage of magnesium; and certain abnormalities in fruit trees, in America, have responded to applications of zinc salts.

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In this country chlorosis of trees, due to a lack of available iron salts, is comparatively common and has been investigated, as it affects fruit trees, by Dr. Wallace of the Long Ashton Research Station. The applications of soluble ferrous salts to the soil has not proved a commercially satisfactory method of treatment. More success has been obtained by grassing down the soil over the roots of affected trees, or by growing other cover crops, or by permitting the growth of weeds. This reduces the amount of oxygen in the soil, and thus leads to the production of soluble ferrous salts from the insoluble ferric compounds of the soil. Injection of ferric citrate into the trunk was found to produce a complete but only temporary cure, the symptoms tending to return some two years after the treatment.

A shortage of available manganese is perhaps the least rare of the conditions under discussion. It is associated with alkaline soils, and is sometimes induced by over-application of lime. One of the present writer's earliest efforts in advisory work led to a disaster which illustrates the point. A particular field was intended for turnips and potatoes, and was known to be heavily infected with finger-and-toe. The farmer was advised to apply a good dressing of waste lime to the portion intended for turnips, but to leave the potato section untreated. The liming was in fact successful in producing a healthy crop of turnips. The following year, however, the whole field was sown with oats, and while the crop on the unlimed section was very good, that on the limed portion was a complete failure and had to be ploughed in. The diseased condition was diagnosed as "grey speck" or "grey leaf" whose cause was then unknown. It is now known to be due to the insolubility of the soil manganese, which had been caused, in this case, by a too free use of lime.

Considerable interest is being taken at present in the question of boron deficiency as the cause of crown-rot in beet. The amount of boron required by any plant appears to be extremely small, and excess is harmful. It has, for instance, been found that culture solutions containing more than one part of boron per million are apt to be toxic. In this country, actual boron deficiency seems to have been noted, under field conditions, only

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in swedes and sugar-beet. "Raen," or boron deficiency in swedes has been described by O'Brien and Dennis, and is important in Dumfries and Galloway.* Crown-rot in beet shows itself about 90 days after sowing. The central leaves first lose colour and then blacken and die off. The disease occurs in patches. In mild cases the plants develop secondary leaves and the roots are stunted, while in more severe cases the plant dies. The trouble is rather widespread in Ireland and a good many experiments, in the use of borax as a preventive, have been conducted on it by the Department of Agriculture, Dublin. A typical experiment, where the disease appeared in the untreated plots in a severe form, gave the following results :—

<i>Borax</i> <i>lb. per acre</i>		<i>Yield of Beet</i>			<i>Sugar content</i> <i>Per cent.</i>
		<i>Tons</i>	<i>cwt.</i>		
0	..	2	8	..	15·3
10	..	5	19	..	17·2
20	..	8	3	..	16·0
30	..	7	12	..	16·9

In this case 10 lb. of borax per acre were insufficient, but 20 lb. per acre gave good results.

In a second experiment, where the disease was mild, the yield was only slightly raised by the application of borax, but the sugar content was favourably affected :—

<i>Borax</i> <i>lb. per acre</i>		<i>Yield of Beet</i>			<i>Sugar Content</i> <i>Per cent.</i>
		<i>Tons</i>	<i>Cwt.</i>		
0	..	10	18	..	18·3
10	..	12	8	..	19·0
20	..	12	12	..	21·9
30	..	12	12	..	22·0

In both these instances the borax was applied at seed time, but considerable benefit was also obtained from top dressings applied after the symptoms had developed. In one case an application of 30 lb. of borax per acre, made on August 18, raised the yield from 2 tons 18 cwt., with a sugar content of 13·8 per cent., to 8 tons 12 cwt., with a sugar content of 15 per cent.

* *Scottish Jour. Agric.*, Vol. XVIII, 4, October, 1935.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended Dec. 18th				
	Bristol	Hull	L'pool	London	Cost per Unit at London
Nitrate of Soda (N. 15½%) ..	£ s. 7 12d	£ s. 7 12d	£ s. 7 12d	£ s. 7 12d	£ s. 9 8
„ „ Granulated (N. 16%)	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of Lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-Chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of Ammonia :—					
Neutral (N. 20·6%) ..	7 0d	7 0d	7 0d	7 0d	6 10
Calcium Cyanamide (N 20·6%)	7 0e	7 0e	7 0e	7 0e	6 10
Kainite (Pot. 14%) ..	2 18	2 15	2 15	2 15	3 11
Potash Salts (Pot. 30%) ..	4 18	4 15	4 13	4 15	3 2
„ „ (Pot. 20%) ..	3 15	3 12	3 10	3 12	3 7
Muriate of Potash (Pot 50%)	7 18	7 16	7 12	7 16	3 1
Sulphate „ „ (Pot. 48%)	9 8	9 6	9 2	9 6	3 10
Basic Slag (P.A. 15¾%) ..	2 10c	2 0c	..	2 6c	2 11
„ „ (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Grd. Rock Phosphate (P.A. 26 —27½%) ..	2 15a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%)	2 19	..	2 19f	2 16g	3 6
„ „ (S.P.A. 13¾%)	2 15	2 13	2 15f	2 12g	3 10
Bone Meal (N. 3¾%, P.A. 20½%)	..	6 17	6 5h	6 5	..
Steamed Bone Flour (N. ¾%, P.A. 27½—29¾%) ..	5 12	5 5	5 2h	5 2	..

Abbreviations : N—Nitrogen ; P.A.—Phosphoric Acid ;
 S.P.A.—Soluble Phosphoric Acid ; Pot.—Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices

† Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots At Bristol, f.o.r. Bridgwater ; at Hull and Liverpool f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons, the price is 5s per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails ; southern rails 1s. 3d. extra.

h Prices shown are f.o.r. Appley Bridge.

NOTES ON FEEDING

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Grass Drying.—Hitherto all attempts at artificial drying of grass have been made with the object of lightening the labours and anxieties of haymakers. The development of plants to dry young grass necessitates a complete reorientation of our ideas on the subject. Yesterday the underlying idea was production of good hay; to-day the idea is the production from British grass land of a concentrated and highly digestible foodstuff. During the last decade a good many firms have endeavoured to adapt large-scale industrial plant or to devise new machines capable of dealing economically with freshly-cut grass. Several machines are now on the market; others are promised shortly.

The national case for grass drying can be stated in a few words. Grass land used for the production of winter keep yields under ordinary systems of management about 8 cwt. of Starch Equivalent (25 cwt. hay of S.E. 33) per acre; given an efficient method of drying the produce, it can be made to yield about $1\frac{1}{2}$ tons of Starch Equivalent per acre—nearly as much, that is to say, as an acre of roots under normal management.

The case from the farmer's standpoint may be viewed from three angles—as a means of reducing purchases of concentrates, as an alternative to haymaking, and as a source of cash income.

The drying plants in existence or about to come into existence differ considerably in design, but have this much in common that they consist of furnaces heated by coke or other fuel, into which the cut grass is introduced in shallow trays or on moving bands. The grass is dried very quickly—from a few minutes, up to $\frac{3}{4}$ hour—and retains its fresh green colour, its digestibility and biological value, its vitamin potency, and, of course, its minerals. Manufacturers appear at present to be concentrating attention on plants capable of turning out from one to three tons of dried grass per work-

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ing day and costs of machines on offer range from about £300 to over £1,000. There is not as yet very much information about operating costs, but Imperial Chemical Industries, who have been running trial plants for several years, put the figure at approximately £2 per ton of dried material.

Grass Drying v. Haymaking.—The yield of digestible matter from hay land is limited by two factors additional to quantity of rain. In the first place, do what we will, hay crops tend to mature all at once. Everyone is agreed as to the desirability of getting hay while still young. On most farms it is a physical impossibility to get it all while it is still young. Nitrogen, as a controlling agent, is a double-edged weapon—it does enable one to produce earlier crops, but a forced crop that, owing to exigencies of weather, has to be left till July before it is cut, is worse than an unmanured crop. Hence the farmer's use of nitrogen is limited.

In the second place, ordinary haymaking involves considerable losses through leaching and bleaching in the field, through mechanical causes, and through fermentation. Most farmers like hay to "sweat" or heat in the stack—apparently under the impression that sweating improves the quality. There does not appear, however, to be any scientific foundation for this belief. Sweating means fermentation and loss of digestible material. The belief that sweating is in itself desirable probably arises from the observation that the best hay, i.e., the youngest, invariably does sweat worse than old hay. In the sense that it is the lesser of two evils, involving smaller losses than weathering in the field, it may perhaps be regarded as a good sign: but even that does not make sweating a desirable process. Collectively, haymaking losses amount to anything from 10 per cent. upwards of the original digestible matter in the grass. Perhaps they can be put on the average at 25 per cent. Unfortunately they tend to be highest in young hay, which is notoriously difficult to make. Neither air nor soil temperature is then as high as later in the season, the original moisture content is high, and the young plant needs a disproportionately long time to dry out.

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The value of young grass as a foodstuff is in part attributable to the high proportion of leaf to stem, and in part to the nature of the compounds making up the plant substance. Recent researches in plant physiology, especially those of Deleanu and his colleagues at Bucharest, emphasize how large are the gaps in our knowledge of internal plant processes. It appears that plants do not take up soil nutrients in a steady stream throughout life. They are absorbed rapidly during the early vegetative stage, but during the later stages there is an actual backflow or "negative migration" into the soil. In oats, for instance, nearly half the nitrogen originally absorbed is ultimately returned to the soil. The shooting stage represents the period of maximum nitrogen content. The extent of the negative migration varies considerably in different plants, and it does not necessarily follow that what is true for oats is true of perennial grasses, though one is tempted to argue from the fact that nitrogen gives its greatest response when the grass is repeatedly cut in the vegetative stage, that some parallel process takes place in the longer-lived species.

Speaking by and large, hay yields in this country—at all events on permanent grass land—are distressingly low. Twenty-five cwt. (out of the stack) per acre is probably a generous estimate of the average yield, while the S.E. produced may be put at 8 cwt. For the dairy farmer hay is essentially a maintenance fodder.

The losses incidental to haymaking are completely cut out if grass is dried rapidly in an efficient desiccator. Moreover, the use of a drier that can operate at any time makes it possible safely to use nitrogen in liberal quantities and to force grass land to its maximum capacity. Clearly, however, this will involve a considerable change in the system of management adopted. The product is definitely a production or maintenance *cum* production fodder.

Producing Grass for Drying.—Grass yields vary so greatly with the level of fertility, and still more with rainfall, that it is almost impossible to estimate the return to be expected. At Reaseheath, liberally-treated old pastures cut at intervals of a month gave

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in 5 years (1929-33) an average return of only 7 tons of fresh grass.* The average return from permanent meadows is certainly higher, while from temporary grass yields of well over 20 tons per acre have been obtained, the superiority of the temporary leys being attributable in the main to the weight of the spring cuts.

In a good area the costs of fairly intensive management of pasture amount to about £4 4s. per acre, and if one accepts 12 tons of green grass per acre as a fair estimate of the average yield, the cost per ton becomes 7s. This is equivalent to 35s. per ton of dried material. A charge of 10s. to £1 per ton of dry grass may perhaps be taken to represent the cost of cutting and carting to the drier.

The total cost of growing, carting and drying seems therefore likely to work out at somewhere around £4 10s. per ton, plus the capital charge on the drying machine.

Dried grass naturally varies in composition according to the season of year and the condition of the grass when cut. It will normally be richest in spring and autumn, while in mid-summer it may fall to the level of very good hay. On the whole, an average content of 12 per cent. digestible protein and 60 per cent. Starch Equivalent may be expected—a content closely approximating to that of weatings. Weatings at £4 10s. per ton would be a very attractive proposition. Unfortunately, the additional capital charge is a very difficult figure to assess, for clearly it will depend among other things on the extent to which the drying plant can be used.

* As records of grass yields are scanty, the following results (cwt. dry matter per acre) from small-scale pasture trials at Reaseheath may perhaps usefully be quoted :—

		<i>Permanent pasture</i>		<i>Temporary pasture</i>	
		<i>Unmanured</i>	<i>Manured</i>	<i>Unmanured</i>	<i>Manured</i>
1929	..	..	17·4	31·5	—
1930	..	..	19·7	31·0	64·5
1931	..	..	13·0	23·8	56·1
1932	..	..	27·9	40·4	61·9
1933	..	..	13·0	17·9	40·1
1934	..	..	28·3	33·1	42·2
1935	..	..	47·5	59·0	—
Average	..	..	23·9	33·8	48·1
					62·0

NOTES ON FEEDING

The first problem for the farmer who is contemplating the purchase of a machine is to determine how much dried grass he requires.

It is known that cows yielding 5 or 6 gal. of milk per day can be fed successfully on dried grass only. It is also certain that dry cows and young stock can be wintered satisfactorily on dried grass, selected for the purpose.

Theoretically, on a large dairy farm it should be possible, by careful grading of the produce, dried at different periods of the growing season, to provide the exact requirements of every type of stock. There is unquestionably much to be said for the policy of going the whole hog; it is the policy adopted by at least one pioneer who is known to us. It has the merit of utilizing to the full the large capital sunk in the drying machine. In these circumstances the prospective consumption of a cow may be put at 2 tons during the winter. A hundred cows would therefore utilize all the dried grass that a large machine could turn out in the course of a summer. Foodstuffs bills would be completely cut out and the worries of hay harvest banished.

Most people who contemplate grass drying will, we conceive, be likely to adopt a more cautious policy, providing for about half the food requirements of their herds by dried grass and half through the ordinary medium of hay and concentrates. The difficulties in such case of working an expensive machine economically are magnified. A medium sized machine capable of producing a ton of dried grass a day costs £700. If only 60 or 70 tons a year are dried, and depreciation is put at the figure one would normally be disposed to adopt for a new plant, viz. 20 per cent. per annum, the charge adds about £2 per ton to the material. Clearly an expensive machine would be justified only on a very large farm, if the owner's intention was to use it for only a portion of the winter requirements of his stock.

On the other hand, this scheme of utilization allows of exploitation of the foodstuffs market. Usually there is some specially cheap foodstuff on the market. At present, for instance, maize is very cheap; it is scarcely believable that anyone can produce dried grass at as low a cost per unit of Starch Equivalent as it can

NOTES ON FEEDING

at the moment be purchased in maize. To be tied by one's own summer procedure to use expensively-produced dried grass when an alternative or partial alternative in the open market was available would be very galling.

Inevitably the question of the price of purchased alternatives to home-produced goods cuts across all arguments anent the productivity of English land. Nationalists in theory, with a firm belief in making the most of English soil, we are all alike in preferring to buy if we think we can buy more cheaply than we can produce!

There remains the third possibility of producing grass for sale. It is highly probable that there will arise a small but keen demand for artificially-dried grass, and the market price may easily be high enough to justify sales, at any rate in the neighbourhood of the producing farm.

Allocation of Land.—It is in the last degree unlikely that land at present economically used for pasturage could more profitably be employed for the production of dried grass. The obvious area to aim at is the permanent meadow and the temporary ley. If and when grass driers become a common feature of farm equipment, considerable changes will be called for in current systems of grass-land management. Plainly, farms with at least a portion of the area in temporary grass will be those best placed to adopt drying practice, for there only will early grass be producible in sufficient quantities. New seed mixtures will be called for to provide a series of cuts, for no mixture in common use to-day will stand up to repeated cutting at short intervals. On permanent grass land there seems no hope of obtaining the maximum theoretical output. Monthly cuts would ruin the productivity of any permanent meadow. It seems to us unlikely that more than two cuts per annum could economically be taken here.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British ..	5 15	0 8	5 7	72	1 6	0·80	9·6
Barley, British feeding	5 5	0 8	4 17	71	1 4	0·71	6·2
" Canadian No.3							
Western ..	5 3	0 8	4 15	71	1 4	0·71	6·2
Persian ..	5 3	0 8	4 15	71	1 4	0·71	6·2
Russian ..	5 3	0 8	4 15	71	1 4	0·71	6·2
Oats, English, white	6 3	0 8	5 15	60	1 11	1·03	7·6
" " black							
and grey	6 3	0 8	5 15	60	1 11	1·03	7·6
" Scotch, white ..	6 18	0 8	6 10	60	2 2	1·16	7·6
" Canadian, No. 2							
Western ..	7 3*	0 8	6 15	60	2 3	1·21	7·6
" Canadian, No. 3							
Western ..	5 17§	0 8	5 9	60	1 10	0·98	7·6
" Canadian,							
mixed feed	5 17	0 8	5 9	60	1 10	0·98	7·6
Maize, Argentine ..	4 5	0 6	3 19	78	1 0	0·54	7·6
" South African,							
No. 2, white, flat	4 7†	0 6	4 1	78	1 0	0·54	7·6
" South African,							
No. 4, yellow, flat	4 7†	0 6	4 1	78	1 0	0·54	7·6
Beans, English,							
Winter	5 15§	0 16	4 19	66	1 6	0·80	10·7
Peas, English, Blue ..	9 0§	0 14	8 6	69	2 5	1·29	18·1
" Indian ..	9 0†	0 14	8 6	69	2 5	1·29	18·1
" Japanese ..	17 7†	0 14	16 13	69	4 10	2·59	18·1
Dari	7 0†	0 7	6 13	74	1 10	0·98	7·2
Milling Offals—							
Bran, British ..	5 17	0 15	5 2	43	2 4	1·25	9·9
" broad ..	6 12	0 15	5 17	43	2 9	1·47	10·0
Middlings, fine,							
imported	6 0	0 12	5 8	69	1 7	0·85	12·1
Weatings† ..	5 17	0 13	5 4	56	1 10	0·98	10·7
" superfine†	6 10	0 12	5 18	69	1 9	0·94	12·1
Pollards, imported	5 10	0 13	4 17	50	1 11	1·03	11·0
Meal, barley	6 7	0 8	5 19	71	1 8	0·89	6·2
" " grade 11	5 12	0 8	5 4	71	1 6	0·80	6·2
" maize	4 17	0 6	4 11	78	1 2	0·62	7·6
" " South							
African	4 12	0 6	4 6	78	1 1	0·58	7·6
" " germ ..	4 15	0 10	4 5	84	1 0	0·54	10·3
" locust bean ..	7 15	0 5	7 10	71	2 1	1·12	3·6
" bean	8 0	0 16	7 4	66	2 2	1·16	19·7
" fish (white) ..	14 15	1 19	12 16	59	4 4	2·32	53·0
Maize, cooked, flaked	5 7	0 6	5 1	84	1 2	0·62	9·2
" gluten feed ..	5 2	0 12	4 10	76	1 2	0·62	19·2
Linseed cake—							
English, 12% oil	8 0	0 19	7 1	74	1 11	1·03	24·6
" 9% ..	7 10	0 19	6 11	74	1 9	0·94	24·6
" 8% ..	7 5	0 19	6 6	74	1 8	0·89	24·6
" 6% ..	7 12§	0 19	6 13	74	1 10	0·98	24·6
Soya-bean cake,							
5½% oil	8 2§	1 6	6 16	69	2 0	1·07	36·9

PRICES OF FEEDING STUFFS (continued)

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Cottonseed cake, English, Egyptian seed, 4½% oil ..	£ s. 4 12	£ s. 0 17	£ s. 3 15	42	s. d. 1 9	d. 0·94	% 17·3
Cottonseed cake, Egyptian, 4½% oil	4 10	0 17	3 13	42	1 9	0·94	17·3
Cottonseed cake, decorticated, 7% oil	7 0†	1 6	5 14	68	1 8	0·89	34·7
Cottonseed meal, decorticated, 7% oil	7 0†	1 6	5 14	70	1 8	0·89	36·8
Coconut cake, 6% oil	6 7	0 17	5 10	77	1 5	0·76	16·4
Ground nut cake, 6-7% oil	6 5*	0 17	5 8	57	1 11	1·03	27·3
Ground nut cake, decorticated 6-7% oil	7 7	1 6	6 1	73	1 8	0·89	41·3
Ground nut cake, imported decorti- cated, 6-7% oil ..	6 12	1 6	5 6	73	1 5	0·76	41·3
Palm-kernel cake, 4½-5½% oil ..	6 0†	0 11	5 9	73	1 6	0·80	16·9
Palm-kernel cake, meal, 4½% oil ..	5 17†	0 11	5 6	73	1 5	0·76	16·9
Palm-kernel meal, 1-2% oil ..	5 12	0 11	5 1	71	1 5	0·76	16·5
Feeding treacle ..	4 12	0 8	4 4	51	1 8	0·89	2·7
Brewers grains, dried ale	4 17	0 10	4 7	48	1 10	0·98	12·5
Brewers' grains, dried porter	4 10	0 10	4 0	48	1 8	0·89	12·5
Dried sugar beet pulp (a)	5 7	0 5	5 2	66	1 7	0·85	5·2

(a) Carriage paid in 5-ton lots.

* At Bristol.

§ At Hull.

† At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of November, 1935, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton, as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22·4, the number of pounds of starch equivalent in one unit, the cost per lb. of starch equivalent is 1·29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such

FARM VALUES OF FEEDING STUFFS

calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—
N, 6s. 9d.; P_2O_5 , 2s. 1d.; K_2O , 3s. 4d.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent</i>	<i>Protein equivalent</i>	<i>Per ton</i>
	<i>Per cent.</i>	<i>Per cent.</i>	<i>£ s.</i>
Barley (imported)	71	6·2	5 3
Maize	78	7·6	4 5
Decorticated ground-nut cake ..	73	41·3	6 19
„ cottonseed cake ..	68	34·7	7 0

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1·25 shillings, and per unit protein equivalent, 1·62 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the December, 1935, issue of the Ministry's JOURNAL, p. 955.)

FARM VALUES

Crop	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9·6	5 6
Oats	60	7·6	4 7
Barley	71	6·2	4 19
Potatoes	18	0·8	1 4
Swedes	7	0·7	0 10
Mangolds	7	0·4	0 9
Beans	66	19·7	5 14
Good meadow hay	37	4·6	2 14
Good oat straw	20	0·9	1 6
Good clover hay	38	7·0	2 19
Vetch and oat silage	13	1·6	0 19
Barley straw	23	0·7	1 10
Wheat straw	13	0·1	0 16
Bean straw	23	1·7	1 12

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

MISCELLANEOUS NOTES

Wart Disease Immunity Trials, 1936

THE Ministry will continue during the coming season to test, at the Potato Testing Station of the National Institute of Agricultural Botany at Ormskirk, Potatoes and Potato Seedlings as to their immunity from or susceptibility to Wart Disease on the conditions stated below.

The entry form (No. 345 H.D.), obtainable from the Ministry should be filled up and returned to the Potato Testing Station, Ormskirk, Lancs., *with the requisite fees*. Samples must be sent to that Station *as early as possible, but in any case not later than March 7*.

Potatoes are accepted from *English, Scottish and Irish growers* for trial under the following conditions:—

(a) Quantity of each stock of Potato to be sent for the first time—50 seed size tubers.

Quantity of each stock of Potato to be sent for the second and for subsequent years—35 seed size tubers.

(b) Fees on the following scale are payable in respect of each stock of Potato when first entered for immunity trials:—

Less than 5 samples from one grower 10s. per sample.

5 samples or more from one grower 8s. per sample up to 20, and 6s. for each sample in excess of 20.

These fees are not returnable under any circumstances.

(c) The Ministry, while taking reasonable precautions to secure satisfactory growth, can accept no responsibility for the failure of any variety.

(d) The Ministry will take all reasonable precautions to secure that all the produce of the trial plots is fed to stock after being thoroughly mixed together, except such portions as may be needed for exhibition or scientific purposes authorized by the Ministry. The Ministry, however, reserves the right to send tubers from the produce grown at Ormskirk for testing at the official stations of the Department of Agriculture for Scotland and the Ministry of Agriculture for Northern Ireland.

(e) All stocks entered for the trials will be tested both in the laboratory and in the field. When the Ministry is satisfied as a result of the trials that a variety is immune from Wart Disease, it will formally "approve" the variety and will issue an official certificate of immunity. Such certificates will not be issued until the variety has been named and until an assurance has been received from the sender that it has been, or is about to be, introduced into commerce. *When a variety tested under a number or letter has been subsequently named and "approved," a sample of 100 tubers of the variety as named must be sent to Ormskirk for comparison with the tested stock.* No certificate will be issued for any new variety until it has passed at least two consecutive years' tests without contracting the disease and has been declared by the Synonym Committee of the National Institute of Agricultural Botany to be distinct from existing varieties.

MISCELLANEOUS NOTES

Potatoes are accepted *from foreign growers* on the conditions (a) to (d) set out above, but no foreign variety will be formally "approved" and no certificate will be issued until the variety is definitely introduced into commerce in Great Britain.

Trials of Seedlings.—The Ministry desires to encourage the breeding of new varieties of potatoes, and in order to provide information for breeders of seedlings it is prepared to accept not fewer than two tubers, and not more than ten tubers, of any seedlings for testing in the laboratory and growing for one season on the trial plots, and to furnish a report on the results obtained, without payment of a fee. These tests, however, will not be considered as forming part of the Immunity Trials proper, and will not be reckoned in the minimum period of two years referred to under (e). The results of these tests will not be included in any report issued by the Ministry.

GENERAL INSTRUCTIONS: Carriage.—Small consignments should be sent by passenger train, carriage paid, or by parcel post; larger consignments should be forwarded by goods train, carriage paid.

Labels.—All consignments should be distinctly labelled. A label bearing the name and address of the sender and name of variety or seedling number should be firmly tied to the bag; in addition a similar label should be placed inside the bag.

Address.—All consignments should be addressed to:—

THE SUPERINTENDENT,
POTATO TESTING STATION,
NATIONAL INSTITUTE OF AGRICULTURAL BOTANY,
ORMSKIRK, LANCs.

Station: Ormskirk, L.M. & S. Railway.

Date of Forwarding.—Consignments should be sent so as to reach the Testing Station as early as possible, and in any case not later than March 7.

The Agricultural Index Number

THE November index number of prices of agricultural produce at 113 (base 1911-13=100) was the same as for the previous month, but 1 point below that recorded for November, 1934. (Taking into account payments under the Wheat Act, 1932, and the Cattle Industry (Emergency Provisions) Act, 1934, the revised general index for November would be 119). The principal price reductions were in barley, hay and dairy cows, while fat sheep, store cattle, pork pigs, eggs and potatoes showed a rise.

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Monthly index numbers of prices of Agricultural Produce. (Corresponding months of 1911-13=100.)

Month	1930	1931	1932	1933	1934	1935
January.. ..	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	114
August	135	121	105	105	119	113
September	142	120	104	107	119	121
October	129	113	100	107	115	113
November	129	112	101	109	114	113
December	126	117	103	110	113	..

Grain.—The average for wheat at 5s. 10d. per cwt. was reduced by 1d. and the index declined 2 points to 78. (If allowance is made for the deficiency payment under the Wheat Act, 1932, the figure would be 124.) Quotations for barley at 8s. 7d. per cwt. were lower by 9d., the index falling from 110 to 101, while oats averaged 6s. 1d. per cwt. compared with 6s. 2d. in the preceding month, causing the index to drop 2 points to 87. In November, 1934, wheat averaged 4s. 11d., barley 8s. 10d. and oats 6s. 7d. per cwt., the indices being 66, 104 and 94 respectively.

Live Stock.—In accordance with the usual seasonal movement, values for fat cattle continued to decline slightly; the average of 30s. 8d. per live cwt. for second quality was 2d. lower, and the index remained unchanged at 92. Fat sheep at 9d. per lb. for second quality were $\frac{1}{4}$ d. dearer, but as a proportionately higher increase occurred in the corresponding months of the base period, the index moved downwards from 121 to 120. Baconers and porkers were dearer by 1d. and 6d. per score respectively, and the indices rose by 3 points to 93 for the former and by 4 points to 103 for the latter. There was a decline of 10s. per head in the price of dairy cows, the index at 103 being lower by 4 points. Store cattle appreciated by 3s. per head during the period under review, but, as this was a normal rise for the time of year, the index at 90 remained unchanged. Store sheep and pigs also were a little dearer, but on account of a much larger increase in

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price for the former and a fall in value for the latter during the base period, the index for sheep fell from 120 to 112, while that for pigs rose from 124 to 129.

Dairy and Poultry Produce.—There was no change in the regional contract price of milk in November as compared with October and the index was unaltered at 171. Farm butter advanced by $\frac{3}{4}d.$ per lb. and cheese 5s. per cwt. on the month, and the index figures for these products at 97 and 87 showed increases of 2 and 5 points respectively. The rise of $3d.$ per dozen in the price of eggs was not so great as in November of the base period, and the index moved downwards from 118 to 109; at this level eggs were 2 points lower than a year ago. Poultry prices were very little altered on the month.

Other Commodities.—Average quotations for potatoes appreciated by 4s. per ton, the index advancing by 8 points to 160. Hay prices were again reduced and the combined index declined from 91 to 84. Wool showed a small increase both in value and index.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13=100.)

Commodity	1933	1934	1935			
	Nov.	Nov.	Aug.	Sept.	Oct.	Nov.
Wheat	61	66	60	64	80	78
Barley	110	104	103	121	110	101
Oats	76	94	92	90	89	87
Fat cattle ..	100	96	92	94	92	92
„ sheep ..	110	123	114	114	121	120
Bacon pigs ..	104	103	98	93	90	93
Pork „ ..	118	118	97	98	99	103
Dairy cows ..	107	105	102	105	107	103
Store cattle ..	85	83	89	88	90	90
„ sheep ..	90	107	111	124	120	112
„ pigs ..	144	147	118	122	124	129
Eggs	108	111	133	119	118	109
Poultry	120	114	115	117	117	118
Milk	161	161	175	215	171	171
Butter	95	83	92	89	95	97
Cheese	105	93	85	78	82	87
Potatoes	115	146	137	147	152	160
Hay	78	104	101	95	91	84
Wool	81	85	89	89	89	91

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Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	127	116	117	124	126	124
Fat Cattle ..	—	110	107	109	107	106
General Index ..	113	120	120	128	120	119

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages' Board was held at King's Buildings, Smith Square, London, S.W.1, on December 17, 1935, the Rt. Hon. the Viscount Ullswater presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders:—

Berkshire.—An Order fixing minimum and overtime rates of wages to come into force on December 29, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until December 26, 1936. The minimum rates for male workers of 21 years of age and over are 31s. per week of 50 hours all the year round (instead of 30s. per week of 50 hours in summer and 48 hours in winter as at present), except in the weeks in which Good Friday, Whit Monday, and Christmas Day fall when the hours are 41, with overtime at 9d. per hour (instead of 8½d. per hour as at present). The minimum rate for female workers of 19 years of age and over is unchanged at 5d. per hour.

Cornwall and Isles of Scilly.—An Order continuing the existing minimum and overtime rates of wages from December 22, 1935 (i.e., the day following that on which the existing rates are due to expire) until December 19, 1936. The minimum rates for male workers of 21 years of age and over are 32s. per week of 51 hours, except in the week in which Christmas Day and Boxing Day fall, when the hours are 33, and in the weeks in which New Year's Day, Good Friday and Whit Monday fall, when the hours are 42. The overtime rates for male workers of 21 years of age and over are 9d. per hour on weekdays and 10d. per hour on Sundays. The minimum rate for female workers of 20 years of age and over is 5d. per hour for all time worked.

Derbyshire.—(1) An Order continuing the existing minimum and overtime rates of wages from December 26, 1935 (i.e., the day following that on which the existing rates are due to expire) until December 25, 1936. The minimum rates for male workers of 21 years of age and over are 8d. per hour for a week of 54 hours with overtime (i.e., employment on Sunday) at 10d. per hour and for female workers of 18 years of age and over 5d. per hour, with overtime at 8d. per hour.

(2) An Order fixing special rates of wages for male workers of 18 years of age and over for overtime employment on the Hay and Corn Harvests of 1936; the rate for male workers of 21 years of age and over is 9d. per hour.

Hants and Isle of Wight.—An Order fixing minimum and overtime rates of wages to come into force on December 29, 1935 (i.e., the day on which the existing rates are due to expire) and to continue in operation until December 26, 1936. The minimum rates for male workers of 21 years of age and over are unchanged at 31s. per week of 41½ hours in the week in which Good Friday falls, except in the case of a worker who, in lieu of the day's

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holiday in this week, is given a clear day's holiday in the following week, in which case the minimum weekly wage is payable in respect of 51 hours; 51 hours in the week in which Easter Monday falls, except in the case of a worker who in lieu of a day's holiday in the previous week, is given a holiday in this week, in which case the minimum weekly wage is payable in respect of $41\frac{1}{2}$ hours; 51 hours in any other week in summer; $40\frac{1}{2}$ hours in the week in which Christmas Day falls; and 48 hours in any other week in winter, with overtime throughout the year at $9d.$ per hour (instead of $8d.$ per hour as at present), except in the case of carters, cowmen, shepherds and milkers for work in connexion with the immediate care of animals in which case the overtime rate is $8d.$ per hour (instead of $7\frac{1}{2}d.$ per hour as at present). The minimum rate for female workers of 18 years of age and over remains unchanged at $5d.$ per hour for all time worked.

Norfolk.—An Order continuing the existing minimum and overtime rates of wages from December 29, 1935 (i.e., the day following that on which the existing rates are due to expire) until December 26, 1936. The minimum rates for male workers of 21 years of age and over are $31s. 6d.$ per week of 50 hours in summer except in the week in which Good Friday falls when the hours are 42, and 48 hours in winter, except in the week in which Christmas Day falls when the hours are 40; with, in addition, in the case of workers employed as teamsmen, cowmen, shepherds and yardmen, $5s. 6d.$ per week, and in the case of sheep-tenders and bullock-tenders $4s. 6d.$ per week, in lieu of overtime in respect of work in connexion with animals other than such work on Good Friday and Christmas Day in respect of which an additional sum of $5s.$ is payable, except where a day's holiday on full pay is given in the weeks in which those holidays fall or in the weeks immediately following. The overtime rates for all male workers of 21 years of age and over are $9d.$ per hour on weekdays and $11d.$ per hour on Sundays. The minimum rate for female workers of 18 years of age and over is $5d.$ per hour, with overtime at $6\frac{1}{2}d.$ per hour on weekdays and $7\frac{1}{2}d.$ per hour on Sundays.

Surrey.—An Order continuing the existing minimum and overtime rates of wages from December 22, 1935 (i.e., the day following that on which the existing rates are due to expire) until December 19, 1936. The minimum rates are: (1) in the case of skilled male workers (horsemen, stockmen and shepherds) of 21 years of age and over $38s. 8d.$ per week of 60 hours, except in the weeks in which Christmas Day and Good Friday fall when the hours are 51; (2) in the case of other male workers (except casual workers) of 21 years of age and over, $32s. 3d.$ per week of 50 hours, except in the weeks in which Christmas Day and Good Friday fall when the hours are 41; and (3) in the case of casual workers of 21 years of age and over $7\frac{1}{2}d.$ per hour. In regard to (1) and (2) provision is made for the payment of minimum rates of wages in respect of the reduced number of hours in Easter week instead of the week in which Good Friday falls if a holiday is given on Easter Monday in lieu of one on Good Friday. The overtime rates for all classes of adult male workers are $9d.$ per hour on weekdays and $11d.$ on Sundays. The minimum rate for female workers of 18 years of age and over is $5\frac{1}{2}d.$ per hour with overtime at $7d.$ per hour on weekdays and $8d.$ per hour on Sundays.

Wiltshire.—An Order fixing minimum and overtime rates of

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wages to come into force on December 29, 1935 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until December 26, 1936. The minimum rates for male workers of 21 years of age and over are 31s. per week of 50 hours, except in the weeks in which Good Friday and Christmas Day fall when the hours are 41, with overtime throughout the period at 9d. per hour on weekdays and 10d. per hour on Sundays, Good Friday and Christmas Day (instead of 8d. per hour as at present). The rate for overtime employment on harvest work on the Hay and Corn Harvests on weekdays is unchanged at 9d. per hour. The minimum rate for female workers of 18 years of age and over is unchanged at 5d. per hour.

Enforcement of Minimum Rates of Wages.—During the month ending December 13, 1935, legal proceedings were taken against six employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow :—

Committee Area.	Court.	Fines Imposed.	Costs Allowed.	Arrears of wages ordered.	workers involved.
		£ s. d.	£ s. d.	£ s. d.	
Cheshire	Stockport	6 0 0	15 0	70 0 0	3
Cornwall	Helston	2 0 0	—	4 0 0	1
Yorks,W.R.	Doncaster	5 0 0	—	17 17 6	1
Carmarthen	Carmarthen	1 0 0	1 7 0	3 13 8	2
"	"	10 0	1 13 6	8 19 11	2*
"	Whitland	1 0 0	—	10 5 7	1
		15 10 0	3 15 6	114 16 8	10

*Case of one worker dismissed.

Second German Poultry Exhibition, Magdeburg, 1936. The Second German Poultry Exhibition will be held at Magdeburg from January 10 to 12, 1936, under the auspices of the German Exhibiting Poultry Breeders' Association. Some 20,000 birds were on view at the previous show, which took place at Essen in 1935, and it is hoped that this number may be exceeded at the forthcoming exhibition. Full particulars may be obtained on application to the Secretary, Reichsfachgruppe Ausstellungsgeflügelzüchter e.V., Hafenplatz 5, Berlin, S.W.11.

Foot-and-Mouth Disease.—Outbreaks of Foot-and-Mouth disease were confirmed, on December 22, 25 and 30, near Swansea, Glamorgan-shire, and, on December 24, 26 and 27, near Malmesbury, Swindon, Wilts. Orders have been made declaring Infected Areas over a radius of approximately 15 miles round each of the infected premises.

WIRELESS TALKS TO FARMERS, JANUARY, 1936

<i>Station</i>	<i>Date</i>	<i>Time: p.m.</i>	<i>Speaker</i>	<i>Subject</i>
National	1, 8, 15, 22	7.5	Professor J. A. Scott Watson	For Farmers only
North ..	10	6.30	Professor J. A. Han- ley and Another	For Northern Far- mers
	24	6.30	Mr. W. B. Mercer	Beef
Midland ..	7	6.30	Mr. E. Moore Darling	Our Country Cor- respondent : Shropshire
	9	6.30	Mr. W. B. Thomp- son	For Midland Far- mers
	16	9.10	Mr. S. L. Bensusan	" Back to the Land " · the Midland Tour in retrospect
West ..	2, 16 & 30	6.30	Mr. A. W. Ling	For Western Far- mers.
	24	8.0	Not yet fixed	Gunter's Farm
N. Ireland†	10	8.15	Mr. Peter Fitz- patrick	Farmers' Work and Worry
Scottish **	2	6.35	Not yet fixed	Talk to Scottish Farmers
	10	7.15	Mr. R. L. Scarlett	For Scottish Far- mers
	16	*	Mr Arthur Crichton	Forage for Winter Feed
	24	6.30	Mr. R. L. Scarlett	For Scottish Far- mers
	30	*	Professor James Hendrik	Spring Manuring

The Welsh Station broadcasts a monthly talk " For Welsh Farmers in Particular," which deals mainly with farming matters of special Welsh interest, and is given in the Welsh language.

* For time of this talk, see *The Radio Times* for the relative week.

† From the Northern Ireland Station a series of farming talks, by Mr. Peter Fitzpatrick, will be given in the Children's Hour under the title : " Peter Comes in from the Farm." This series will give children information about the farmer's work at different times of the year. The first talk will be on January 6.

** The series of talks, " New Ventures in Scotland," from the Scottish Station continues in the New Year with three talks dealing with the trend of developments in Scottish Agriculture. The speaker is Mr. Norman C. Wright, M.A., Ph.D. (Director of the Hannah Dairy Research Institute, Ayr), and the following is an outline of the points which will be discussed :—

January 15 : Introduction. Marketing schemes as a new venture. Rationalizing production and distribution. Marketing policy : limitation of production or increase of consumption. Improving the standard of agricultural produce by grading and by National Mark Schemes.

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January 22 : Agricultural de-population. The influence of mechanization and of new methods of management. Land Reclamation. Afforestation. Small holdings, and the development of the poultry industry and of fruit and vegetable cultivation. Canning. Plot-holding and allotments.

January 29 : The livestock industry as Scotland's chief hope in agriculture. New means of improving or cheapening production. Grassland management. Methods of grass conservation. Hay grading. The improvement of hill pastures. Elimination of livestock losses, including disease eradication. General summary.

APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS ENGLAND

Nottinghamshire : Mr. J. C. Blossom, B.Sc. (Agric.), N.D.A., N.D.D., has been appointed Assistant Agricultural Organizer, *vice* Mr G. F. Kingston, M.A.

Yorkshire : Mr. T. E. Miller, M.Sc., N.D.A., has been appointed District Lecturer in Agriculture, *vice* Mr. D. H. Finlay, B.Sc.

Mr. F. W. Shepherd, N.D.H., has been appointed Instructor in Horticulture, *vice* Mr. W. Lodge, retired.

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The Agricultural Dilemma. A Report of an Inquiry organized by Viscount Astor and Mr. B. Seeböhm Rowntree. Pp. xii + 101 (London : P. S. King & Son Ltd. 1935. Price 2s. 6d.)

The object of the inquiry that yielded the results presented in this book was to discover whether a large-scale policy of land settlement offers a possible or desirable method of relieving unemployment. The answer that it gives is a negative one ; a fact that deserves particular attention in view of the bias in the opposite direction with which a number of the investigators entered upon their task. Lord Astor is justified in asking, in his preface, that the conclusions here presented should be considered not only on their merits but in the light of those facts.

The report (which was drafted by Mr. H. D. Henderson) opens with a survey of the world agricultural situation. World agriculture to-day is under the influence of three adverse factors : (i) the decline in the rate of growth of the populations of the Western European countries that constitute the chief actual or potential markets for imported foodstuffs, (ii) the rapid improvement in agricultural productivity ; and (iii) the development of high agrarian protectionism in Europe. None of these influences is likely to prove transient, and together they represent for the food-exporting countries as a whole " a formidable combination of unfriendly forces." For Great Britain they mean, on the one hand, that the terms on which the British farmer competes with the farmers of the great exporting countries are not likely to become more favourable, at least as far as the major staple products are concerned ; and, on the other hand, that the market for British exports in the agricultural countries,

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already severely damaged by the decline in the earnings of agricultural producers, is likely to be further injured by any policy that substantially diminishes our existing imports of the major products. The decline of exports is the most obstinate and persistent of Great Britain's economic difficulties; and any plan for the revival of employment must at least avoid accentuating this difficulty if it is to escape self-contradiction.

The Report therefore proceeds to examine the possibility of an expansion of domestic agriculture that would not involve interference with our imports of such products as cereals and meat. Evidently this can only be realized in one of two ways: either the increased domestic production must be absorbed by an increase of consumption, so as to leave imports unaffected, or it must be concentrated on the minor commodities such as fruit, vegetables, eggs and poultry, which are economically of less importance to the exporting countries than the major products, and in whose production the British farmer is often favoured both by nature and by proximity to the market.

As regards the possibility of increased consumption, the Report points out some increase can be expected as a result of the rise of real incomes, and of any economies in marketing that may be secured by better organization; but, taken in conjunction with the increase of agricultural productivity, it is not likely to make a substantial difference to the employment situation. Nor would it be wise to place much reliance on the possibility of State subsidies to consumption, important though that would be from the dietetic point of view; since any such policy would, for financial and other reasons, have to be confined within fairly narrow limits.

The same conclusion is reached with regard to the second alternative—an expansion of British agriculture based on increased production of fruit, vegetables, eggs and poultry. Imports of these products (or such of them as compete with home production) have already been substantially reduced in the past few years, without noticeable effect on the declining trend of the British agricultural population. It is very unlikely that even the complete exclusion of the remaining imports would provide scope for settling men on the land "in the large numbers which are often spoken of in this connexion." Further, existing imports of this class of goods largely originate either from Empire countries or from countries with which commercial agreements, embodying reciprocal concessions, are in force.

Thus the fact has to be faced, in the authors' view, that large-scale land settlement in this country would be impossible without a considerable diminution of our imports of the major agricultural products; of products, that is to say, that can only be produced at relatively high cost in this country, that represent major economic interests of the food exporting countries, and upon the exchange of which for the manufactured exports of this country the prosperity of the British Empire has largely been built. Such a policy, in their opinion, would "strike at international trade at one of the points where the advantages of an international division of labour are conspicuous and indisputable. . . . It would mean rendering functionless much of the equipment, organization and personnel which is specialized overseas in primary production with the corollary of rendering functionless much of our industrial life which is specialized for export. Such a policy would run counter to the whole idea of a rational development of the world's economy."

This conclusion is reinforced by an examination of the probable consequences of a large-scale land settlement policy on the agricultural industry itself. "Many persons," the authors observe, "who would

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appreciate at once the folly, and the unfairness to the industry concerned, of attempting to establish large numbers of new workers in a manufacturing industry which already showed signs of over-production, seem unaware in the case of agriculture, that such questions need even be considered." On the other hand, the authors do not deny that many of the unemployed men in the distressed areas who have little or no chance of returning to industrial employment, might nevertheless prove quite efficient as land workers. It is possible, therefore, that land settlement on a moderate scale may have some contribution to make to the solution of the problem of the distressed areas; but existing economic conditions forbid the expectation that many of the men thus settled would be able to earn a livelihood from the land, and suggest that agriculture should be regarded as the means of giving them part-time rather than full-time employment. In any case, the authors suggest, it must be recognized that schemes of this sort cannot be expected to make any material difference to the size of the agricultural population as a whole, and that in fact they might merely have the effect of accelerating the withdrawal from agriculture of other workers in other areas.

At the same time the authors are careful to point out that their conclusions do not imply any disparagement of the results of the statutory smallholdings movement, results which have, in the main been such as justify, in their view, the policy that was initiated in 1908. It is stated that the smallholdings system has offered to the agricultural labourer of enterprise and character and thrift, the possibility of escape from his otherwise restricted lot; it has supplied an opening for many others who feel that their vocation lies in work on their own account upon the land; and it has introduced a greater flexibility into the social structure of the countryside. The authors are of opinion that the system has by no means exhausted its usefulness for such purposes, and they favour a policy of the steady creation of smallholdings to meet the normal demands of the rural population.

Plant Life : a Text-book of Botany. By D. B. Swingle, Professor of Botany, Montana State College. Pp. xiv + 441, and 290 Figs. (London : Chapman & Hall, Ltd. 1935. Price 15s.)

Text-books are already legion and yet their number still increases, presumably because every University and every syllabus makes different demands on the student. This also makes it difficult to judge the merits of any textbook apart from its associated syllabus. Two objects are pursued by the author of this volume: first he states that plant activity, not morphology, is to be the central theme, and, secondly, he attempts to present his matter in a novel and interesting manner. More than one-third of the text is, however, devoted to descriptions of the numerous "types" and different kinds of plants, with whose life histories the student is expected to be familiar, and it is for this portion that the text-book will be valued, since it is particularly well written and clearly illustrated. In a syllabus where this aspect of botany is of major importance the sections on physiology would form a sufficient background, although they would be insufficient in many university courses. The endeavour to make the student interested has resulted in the discussion of specially interesting cases (e.g., of hydrophytes and xerophytes on page 41) before the normal type is thoroughly described, and this is perhaps likely to lead to confusion. The book is thoroughly well illustrated and attractively produced.

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Farm Soils ; Their Management and Fertilization. By E. L. Worthen, M.S. Pp. xiii + 468, and 220 Figs. (London : Chapman & Hall Ltd. ; New York : John Wiley & Sons Inc. 1935. Price 13s. 6d.)

This book is probably intended for teachers and students in agricultural colleges in the "Middle West" area of the United States, and should satisfy their requirements reasonably well. The author gives, in some detail, practical instructions for carrying out the usual farm operations in such a region, but unfortunately he seldom states clearly or accurately the general principles underlying his recommendations. In consequence, unless the reader is aware of the conditions existing in the "Middle West," he will not be able to distinguish between recommendations that apply specifically to this area and those that are likely to be valuable elsewhere. This volume should therefore be used for reference in regard to "Middle-West" agricultural practice, and not as a text-book applicable to farming in this country.

Garden Science. By J. Grainger, Ph D., B.Sc. Pp. 265, and 110 Figs. (London : University Press Ltd. 1935. Price 4s. 6d.)

This book was designed by the author, who has had some years' experience in lecturing to teachers and allotment societies, to meet the needs of amateurs, horticultural students, and pupils in school gardens. The most valuable part of the book consists of the discussions of underlying scientific principles and physiological processes, and in particular the inclusion of recent discoveries, such as those of Professor Priestley at Leeds University, on plant propagation and seed germination. The practical information given is also valuable, especially that connected with manures and fertilizers. Possibly, however, the book would have gained in value if a definite decision had been taken as to whether the application of scientific principles or frankly practical horticulture was to be the chief theme of the book. By mixing the principles and practice both have suffered by being curtailed.

Botany as an Experimental Science. By Lilian J. Clarke, D.Sc., F.L.S. Pp. xvi + 138, and 35 Figs. (London : Humphrey Milford. 1935. Price 6s.)

Dr. Lilian Clarke is already well known in educational circles for her pioneer work at the James Allen Girls' School, Dulwich, where she was in charge of the botany side from 1896-1926. She succeeded in establishing botany as an experimental science when it was not recognized as such, especially in girls' schools, and this book gives a full record of the work for the benefit of others in the teaching profession. A description is given of the training in scientific method gained by the girls through experiments in plant physiology in the laboratory, practical work in the school gardens, and methods of careful recording. The botany gardens at the James Allen Girls' School are world-famous, and the account of the development of the various ecological formations such as the wood, sand-dune, salt marsh and peat bog is probably unique. As Professor Tansley, in his preface, remarks : "Some may regret that she did not write a regular practical handbook . . . but the material is all there and can be extracted and used to great advantage." It is, as always, a real benefaction when a great pioneer leaves as a legacy a written record of method and details of a rich experience.

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The Journal of the Orkney Agricultural Discussion Society.
Vol. X (1935). Pp. 75. (Kirkwall: Agricultural College, Junction Road. Price 1s. 3d.)

This annual publication furnishes an excellent example of what can be accomplished by energetic and well-organized local effort. The papers and discussions included in this issue deal with such varied subjects as common ailments of foals, poultry housing for the general farm, the pneumatic wheel in modern farming, farm water supply, the agricultural use of electricity, social credit, and shell sand deposits in Orkney. Reports of a debate, and thoughtful papers by junior members, testify to the valuable educational work that is being undertaken by this Society.

The Structure and Composition of Foods. By A. L. Winton, Ph.D., and K. B. Winton, Ph.D. Vol. II.: Vegetables, Legumes, Fruits. Pp. xiv + 904, and 303 Figs. (London: Chapman & Hall Ltd. New York: John Wiley & Sons Inc. Price 75s.)

Volume I of this admirable treatise, dealing with the cereals, starch, oil seeds, nuts, oils and forage plants, appeared about three years ago and received a most favourable notice in the pages of this *Journal*. It was pointed out at the time that a companion volume, dealing with vegetables and fruits, was in course of preparation, and the review ended with the statement that "scientific readers will look forward to its appearance with genuine interest"

The second volume, which has been published quite recently, maintains fully the standard of excellence set by the first. It will be assured of a grateful welcome from teachers and research workers in the domains of agricultural, horticultural and biochemical science, for whom it will constitute a valuable and trustworthy work of reference. A clue to the aims of the authors is provided by the short preface, in which they state: "The chemical sections of this volume, in addition to typical conventional analyses, record epoch-making discoveries, largely recent, on the occurrence and constitution of lesser-known constituents such as organic acids, pectins, natural flavours, colours (notably chlorophyll, carotenoids, lyochromes and anthocyanins), the chemical substances classed as vitamins, and minor mineral constituents. Complete unanimity of conclusions on certain points can hardly be expected; nevertheless, the matter available, on the whole, fills with remarkable completeness the gaps in the literature."

The comprehensiveness of the information supplied in this second volume is shown by the index of contents. The work is divided into two main sections, the first dealing with vegetables and the second with fruits. Under the main heading of "Vegetables" come sections dealing with mushrooms, root vegetables; tuber, corm and rhizome vegetables; leaf and stem vegetables, flower vegetables, fruit and seed vegetables. Space forbids mention of the numerous sub-sections into which the foregoing sections are further divided. Under the heading of "Fruits" are sections dealing with the fruits of 35 different families, including, to mention but a few, the palm, pineapple, banana, saxifrage, rose, laurel, grape, pea, mahogany, papaw, rue, heath and mallow families. The treatment of every vegetable and fruit follows a definite sequence. After statements respecting origin, habitat, botanical relationships and uses, the scientific subject matter is dealt with under three main heads (i) macroscopic structure; (ii) microscopic structure; (iii) chemical composition.

Through the medium of this treatise an immense store of facts, many of which will not be found in the usual text-books of agricultural and horticultural science, becomes available to the scientific reader.

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The volume will for this reason be specially appreciated by the student and research worker, who will further be grateful for the many illustrations, reproduced with the same exemplary clearness as characterized those in the first volume, and for the references to original publications with which the pages abound. Finally, it may be noted that a third volume, dealing with milk, meat, fish, eggs, sugars, tea, coffee, cocoa and spices, is in course of preparation by the same authors.

Grundlagen und Entwicklungsrichtung der landwirtschaftl. Erzeugung in der Südafrikanischen Union. (*The Basis and Development of Agricultural Production in the Union of South Africa.*) By Dr. Carl-Theodor Klugkist. Pp. 94. Reprinted from *Berichte über Landwirtschaft*. (Berlin: Paul Parey, 28 & 29, Hedemannstrasse, S.W.11. 1935. Price RM. 5.60.)

This monograph is one of a series on foreign agricultural conditions, and summarizes very lucidly the almost overwhelming difficulties that South African agricultural industries will have to face in the future. It is customary to think of the Dominions, in contrast to the Mother Country, as primarily agricultural, but South Africa must be regarded as an exception. The country's geographical isolation from the main trade routes of the world has undoubtedly hindered its development, but a still more potent and insuperable factor from the agricultural standpoint has been the unfavourable climatic conditions, particularly the shortage of rain.

There seems little chance that South Africa will ever be able to compete on equal terms in the world's market with the great exporting countries. Unlike many other parts of the Empire, such agricultural development as has occurred in South Africa has not been the result of the natural productivity of the soil, but rather of the discovery of gold and, more recently, of the stimulus subsequent to the War. Both of these stimuli are evanescent, and the supreme problem in South Africa may be how to ensure the continuance of a white man's civilization in a black man's country after the gold mines are exhausted. It can only be ensured by agriculture taking the place, and enjoying at least a part of the prosperity, of the mining industry. At the beginning of the Great War, South Africa was still a net importer of agricultural produce, and it is only recently that the Union has become self-sufficient in regard to foodstuffs. This state, moreover, has only been attained with the help of high tariffs and heavy subsidies derived from the profits of the gold mines.

Not only for this reason, but also because the market for agricultural produce is mainly internal, the fortunes of agriculture are very dependent on those of mining. Dr. Klugkist suggests that as the mining population disappears, its place as a consumer may be taken by the native population, which, by reason of the limited area in which it is segregated, is unable fully to supply its own needs. So long as native-owned land, and therefore wealth, is limited to its present confined extent, it seems unlikely that the natives will become important buyers of European agricultural produce. The alternative is to develop the export market in face of the obstacles presented by unfavourable geographical location and climate. The fruit industry offers considerable scope, since the South African fruit season enables imports to reach Europe at a time when competition from other countries is lowest. Dr. Klugkist emphasizes that an intensification of cattle and sheep farming must form the basis of any rational agricultural policy, but in a country with so low a natural productivity, it will need all the arts of science and practice to achieve enough to ensure a stable and prosperous future for South African agriculture and civilization.

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Colloids in Agriculture. By C. E. Marshall, M.Sc., Ph.D. Pp. viii + 184, and 14 Figs. (London : Edward Arnold & Co. 1935. Price 5s.)

Many of the advances recently made in scientific agriculture have been based on colloid science, and it is becoming increasingly necessary for agricultural research workers to have a working knowledge of this important subject. Dr. Marshall's aim in this book is to provide this knowledge. The first part of the book is devoted to the general properties of colloids, which are briefly and clearly described. The properties are illustrated by discussing such topics as coagulation of clays, adsorption with special reference to the preparation of emulsions and sprays, and the frost- and drought-resistance of plants. This part is excellent, and it constitutes one of the best accounts of colloids available to the agriculturist.

The second part deals with the soil colloids. It contains a clear account of the author's views on the structure of clay particles, of the organic colloids in the soil, of the processes of soil formation, and of the influence of the soil colloids on soil texture and cultivation. Here the soil expert will sometimes find himself in disagreement with the author, though only on minor points. For example, on p. 89, he states that hydrogen, calcium and magnesium clays do not form stable concentrated deflocculated suspensions—whereas it is quite easy to prepare such suspensions. Again, on p. 116, he stated that in arid soils water continually moves upwards during the dry seasons, thus producing salt soils; actually, such soils are only produced when ground water is near the surface, as in low river terraces or sumps. On p. 119, he states that podsoles require a lower mean temperature than brown earths; in point of fact podsoles occur on the warm heath lands of south-east England and brown earths occur in cool parts of Scotland. These, however, do not seriously detract from the value of the book.

The third part deals with colloids of plant and animal life, and sets out in simple language the present views on fibre structure and proteins. It also contains a good description of the milk colloids, butter-making and the properties that a satisfactory insecticide spray should possess. This part also is excellent.

The field of agricultural colloids is well covered, and the book is commendably free from misprints. It can be confidently recommended to all who want a clear and simple presentation of the subject.

Applied Entomology. By H. T. Fernald, Ph.D. Pp. x + 403. (London : McGraw-Hill Publishing Co. Ltd. 1935. Price 21s.)

This is the third edition of an American text-book, originally published in 1921, and now revised and brought up to date. Brief introductory chapters deal with the external and internal structure and the development of insects, with losses and benefits due to insects, and with chemical and other methods of control. These are followed by accounts of the bionomics of the chief pests of the United States arranged under the orders of insects to which they belong, and the control measures adopted are also discussed. Finally, there is a short chapter on animals, other than insects, that normally come within the province of the economic entomologist. The volume is well and fully illustrated, and there is a good index.

The field covered is thus a very large one, and in some sections, notably that dealing with chemical control measures, in which subject there have been very considerable advances of knowledge in recent years, the author's brief treatment hardly seems adequate. Dr. Fernald, however, writes very clearly, and the great mass of facts dealt with has been skilfully condensed into comparatively small space.

Students of economic entomology will find the book full of interesting and valuable information, but, as the number of important insect

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pests common to this country and America is not very large, it will probably not appeal to any great extent to farmers and fruit-growers in Great Britain.

The Land Now and Tomorrow. By R. G. Stapledon, C.B.E., M.A. Pp. xvii + 336, 14 Figs. and 2 Maps. (London : Faber & Faber Ltd. 1935. Price 15s.)

Many writers have offered prophecies of what will be done with the land in this country, but few of them have been so well informed on the subject, or so far-seeing in envisaging all the factors involved, as Professor Stapledon of the Welsh Plant Breeding Station. Professor Stapledon's name is already widely known for his work in the field of plant breeding and land reclamation, in relation to the grasses that form the herbage of so large a proportion of the agricultural land of this country. He set himself no mean task in the writing of this book, and it is not too much to say, with the humblest admiration of his achievements, that he has provided matter that should be a cause of close reflection among all who are concerned in any way with questions affecting the use of the land. Those really concerned can be no less than the total population of the country, because from the most under-paid farm labourer to the urban worker whose activities are apparently most remote from the land, every human being, as well as every animal in the country, depends upon the soil for normal sustenance.

Apart from the difficulties of the farming industry itself, the question of what we, as a nation, intend to do with the soil of our country in the future, is very wide and important. Are we to continue to muddle along considering the high-flown schemes of political visionaries until the problem has become so complex that there is no possibility of finding any sort of answer, or are we to use our God-given intelligence and direct our united efforts towards a rational act? That is the theme of Professor Stapledon's book, and while he attempts to provide his own concept of the answer, he makes it clear that his main effort is to pose the question.

It should not be difficult for everyone to understand that the soil of this country is everywhere, or almost everywhere, capable of improvement, solely from the point of view of agricultural production. Even the land that is, within the concept of to-day most highly farmed, can be induced to yield more richly. What is true of the best-farmed land is even more true of that which we have come to consider to be the fringes of the margin of cultivation. Professor Stapledon's own work has shown that the remote hill-grazing of mid-Wales, of Yorkshire, of Devon and Cornwall, and of the Scottish Highlands, can be economically treated in such a way that it will carry more sustaining herbage. It would then enable us to increase the numbers of our flocks and herds, and provide our population with home-grown mutton and beef, which will, it is believed, contain more valuable nutrient elements than are present in the imported product. While the question of comparative nutritive value is open, there is no doubt of the advantage of an increased home production from the point of view of economic autonomy. Of this aspect of the question Professor Stapledon leaves us in no doubt.

There are, however, other and equally important questions involved in the utilization of land. The large extension of our cities, the area of our improved roads, the increase in the number of sports grounds and such things, all involve a circumscription of the possible agricultural area, and Professor Stapledon does not forget to give due weight to the economic necessity for the urban activities of man. He suggests, however, that in order to make the best use of the limited

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surface of this country, authority should be taken to ensure that the best farm lands are not submerged in a sea of buildings, nor covered with a layer of concrete to allow of the passage of fast motor traffic. Again, Professor Stapledon considers in great detail the amenity-value of the countryside, both from the point of view of those who live in it, in what the townsman considers comparative isolation, and of the townsman who wishes to spend his leisure in the country for one reason or another.

As he depicts it, Professor Stapledon's ideal of land utilization seems quite possible of attainment, given the will to carry it out, but when one comes back from the ideal country to which he transports us, a very fallible and difficult world is encountered. The severely practical economist may feel that, after all, this is perhaps only another dream of what might be, rather than a clear picture of what will be. Nevertheless, everything must be conceived before it is executed, and it is certain that readers of this book will be stimulated in the direction of making the dream come true. It is also certain that Professor Stapledon's contribution towards the solution of the question he has postulated will be for many years a major contribution, and will be consulted and considered by all who have the future of the land at heart. Professor Stapledon is undoubtedly a dreamer as well as a front-rank improver of grass land, but it is as a dreamer with keen vision that he has written this book. There must be many who will wish that his ideas may meet with a large measure of success.

World Production and Prices, 1925-1934. Pp. 146. London : Allen & Unwin. 1935. Price 5s.)

"World Production and Prices" (like "World Economic Survey" and "Review of World Trade") is one of a series of annual publications of the Financial and Economic Intelligence Service of the League of Nations. These publications assemble into convenient form all the leading facts and figures illustrating current world economic conditions. "World Production and Prices" provides annual data since 1925 on the volume and value of primary and industrial production (distinguishing the separate crops and products), international trade and shipping, and price movements for several important categories of goods.

A leading feature of this publication is the quantity index of production for foodstuffs and agricultural produce generally. Although this index does not yet include dairy produce, poultry and eggs, fruit and vegetables, it is steadily being made more comprehensive and should be reliable enough to indicate the general trend. It appears that, in 1934, world food production was 2 per cent. above the level of the 1925-29 base (or somewhat higher if the severe fall in fodder cereals in 1934 be omitted); and since the complete index number has at no time exceeded 105, it is clear that the "world agricultural over-supply" to which so many of the world's economic troubles are attributed, must be confined to only a few commodities. It is, however, important to note that the index for Europe, under the impulse of agrarian protectionism, has risen to 111, largely at the expense of the trade in foodstuffs from North America, the production of which has been pushed down to 81.

Moreover, although the over-production of cereal crops has been especially regarded as a cause of agricultural depression, it seems that the increase in these products has been overshadowed by the increase in meat, for which the index in 1934 stood at 112. The authors surmise that other produce (especially dairy produce), for which they have no precise figures, has increased by even more. Generally speaking, therefore, animal produce is at present running at a higher level of

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production than vegetable produce. This is of interest in connexion with a difficulty now experienced by Departments of Agriculture almost everywhere, that while the cereals collapsed early in the depression and have since made some recovery, meat and dairy produce are still continuing to fall in price.

These agricultural considerations do not, of course, occupy more than part of the volume, which is devoted to the world economic situation as a whole. In analysing this situation, the authors have adopted a somewhat novel and extremely important means of approach—that of tracing the development of the price spreads between wholesale and retail goods, raw materials and manufactures, agricultural and non-agricultural goods, consumption goods and capital goods. These data are exceptionally valuable for the comprehension of the course and phases of the depression, and they are likely to be used for the verification of several major points in trade cycle and monetary theory. One of the most hopeful signs of the times is the current tendency for these price dispersions to narrow in favour of agriculturists and primary producing countries. That this development has not been at the expense of industrial countries, but has acted to restore equilibrium generally, is suggested by the parallel improvement in such countries as the United States, Scandinavia and the United Kingdom. On the whole it seems that the chief disequilibria in the world's price structure are, even allowing for the maladjusted condition of the gold bloc currencies, now substantially mitigated, and less likely than during the last few years to obstruct the course of recovery.

Tissue Culture. By E. N. Wilmer, M.A. Pp. xvi + 126, and 11 Diagrams. (London: Methuen & Co. 1935. Price 3s. 6d.)

This is a short, interesting monograph describing the essential principles underlying tissue culture. Written in simple language, with a glossary defining unavoidable technical terms, it should serve the dual purpose of interesting the student of general biology and of explaining the intricacies of the subject to the prospective specialist. The first section deals with simple survival and proliferation of cells, methods adopted to obtain growth, factors governing cell division and cell metabolism in general. The second part considers organized growth, e.g., the specialization and development of cells for particular functions. A bibliography comprising 206 references is included.

The Cool Greenhouse. By L. N. Sutton. Pp. xii + 186, and 35 Figs. (London: Putnam. 1935. Price 5s.)

Amateur gardeners often gain the greatest satisfaction by making a special hobby of a particular branch of horticulture. The late Mr. L. Sutton first experimented with the cultivation, in the cool greenhouse, of simple flowers raised from seed and usually grown out of doors. Many of his successful results are embodied in this book, which will inspire others to create displays of flowers in a cool greenhouse; this, as the author explains, is within the power of the small owner-gardener of modest means and can extend throughout the year. The greenhouse is considered not as a museum of specimens but as a unit, the scene of a succession of "colour pictures." The introductory chapters cannot fail to rouse the reader's enthusiasm. Successful and striking arrangements are described, the material consisting of annual plants that can be raised from seed. Part II consists of cultural details concerning suitable plants for this form of indoor gardening, concise but informative notes on over 100 plants being included. A large number of excellent photographs, several coloured, add to the stimulating effect of the book, which is an unique and valuable addition to gardening literature.

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Cereals for Spring Sowing

THE following note has been communicated by the National Institute of Agricultural Botany :—

At the beginning of the year, many farmers await with interest the issue of current seedsmen's catalogues, and on their receipt carefully compare the rival claims of the many varieties of seed offered. To help them in their choice of cereal varieties the National Institute of Agricultural Botany continuously carries out comparative trials on a field scale in the north Midlands and the east and south of England, and issues a leaflet, which is revised when ever necessary, setting out the practical results of its investigations. This leaflet is obtainable free of charge through all Agricultural Organizers or direct from the National Institute of Agricultural Botany, Huntingdon Road, Cambridge.

While not encouraging the growing of spring wheat, since it is seldom profitable, the Institute's experience shows that if spring wheat is grown the most satisfactory varieties are Little Joss if drilled by the middle of February, Red Marvel or A.1 for the first half of March, and April Bearded thereafter until the middle of April.

Regarding oats, the Institute recommends Victory, Eagle, Star, Golden Rain and Golden Rain II—the last two essentially for home consumption, for although very heavy yielders their grain is small and its yellow colour does not find universal favour among purchasers.

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Marvellous is recommended for early sowing on good soils, as is the new Cambridge Plant Breeding Institute production Resistance, which, though primarily a winter variety, also produces high yields when sown early in spring.

As to barleys, the Institute restricts its recommendations to the well-known varieties Plumage-Archer 1924 and Spratt-Archer. Trials in progress suggest that Dr. Beaven's "1935" Plumage-Archer will usually give rather higher yields than Plumage-Archer 1924. Where late sowing cannot be avoided Svalof Victory or the Danish Kenia and Maja barleys deserve trial.

Whichever variety is chosen, early sowing almost always pays. English-grown seed gives just as good results as imported seed, if the standard of purity and germination is the same. A further leaflet dealing in general terms with choice of seed in which such points as purity, germination, variety, origin and price are dealt with has been compiled by the Institute, and those who obtain it (gratis) either from County Organizers or direct from the Institute should find it of considerable use when deciding what seed to buy.

Motors in Agriculture

THE use of motors in agriculture, including steam engines, petrol engines and electric motors has been surveyed by the International Institute of Agriculture and is reported by H. J. Hopfen of the Institute in its International Review just issued at Rome. This report shows that the United States has the largest number of tractors engaged in agricultural work, more than in all other countries combined, while Soviet Russia and Canada hold second and third places respectively. The United States also has the largest number of fixed internal combustion engines, but Germany leads in the number of electric motors used in agriculture. In numbers of harvester-threshers the United States leads, with Russia, Argentina and Canada following in the order mentioned. With high prices, highly mechanized farms have realized bigger profits than farms using animal power, but agricultural distress has been more felt during the years of crisis on highly mechanized farms than on farms where animal trac-

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tion has been retained in addition to mechanical traction, because the costs of up-keep of animals have decreased considerably while the working costs for tractors have remained the same or have increased. The degree of mechanization depends on a number of factors, of which size of farms and conditions of land tenure may be considered the most important. Conditions for mechanization are less favourable in European countries (excluding Russia), where farms are smaller and, even more, the wide distribution of small fields is a handicap to highly developed mechanization.

The article suggests that mechanization has had an enormous influence on production, and has reduced the cost in a measure that would have been considered impossible until recent times. Most countries reacted to this lowering of production cost, which in turn caused a fall in prices, by establishing quotas and custom duties.

The Manufacture of Humus by the Indore Process

THERE is surely no technical subject on which all classes of cultivators are so closely in agreement as on the intimate relationship between productivity and the supply of organic matter in the soil. In our home agriculture, the quest for humus extends from large-scale mechanized cereal farming at one end of the scale to intensive market gardening at the other. In the tropics, where the oxidation of organic matter takes place most rapidly, the provision of humic material is often the first step in land improvement. The more intensive the cultivation and the bigger the demands on the soil, the greater the need for steps to maintain the content of organic matter. In England, the very success and persistence of our traditional arable system, based on livestock and temporary grass, is a sign that it supplies the essential needs of the soil. Nevertheless, the question arises whether we are in general maintaining our soils in full productivity. Are we not supplying in the form of artificial fertilizers nutrients that would be better provided, or at least supplemented, by specially-prepared wastes derived from the farm, from industry, and from town refuse or sewage?

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To utilize waste organic matter, some form of composting is necessary. Compost making is perhaps nearly as old as agriculture itself. In their various modifications, composting and the utilization of town wastes form the mainstay of the intensive farming of the thickly-populated and self-supporting districts of China and Japan. From time to time, scientific investigators have turned their attention to these matters, and have conferred precision on what had hitherto been a rule-of-thumb operation. Starting with the work of H. B. Hutchinson and E. H. Richards, whose first paper on "Artificial Farmyard Manure," appeared in this JOURNAL in 1921, the conditions underlying the rotting of straw and waste organic materials generally have been worked out. Another service which the scientific worker has been able to perform is to systematize existing knowledge and practices and draw up methods suitable for local supplies of waste materials, cropping systems, and labour conditions. Finally, there is the possibility of mechanization in its many forms, with the idea of reducing the labour costs of handling bulky material. The possibility of controlled compost-making has been eagerly taken up in many quarters, and there is already an extensive literature on the subject.

The Indore process of compost making developed by Sir Albert Howard and his co-workers at the Institute of Plant Industry, Indore, Central India, from 1925 onwards, is already well known. The process was fully described in a book "The Waste Products of Agriculture," published in 1931, and more recent developments have been reported from time to time. In a lecture to the Society of Arts, on November 13 last, Sir Albert Howard gave an account of the present position and future prospects of the Indore process and its modifications; and, since it appears possible that certain aspects of the system may find application in British farming, the following notes may be of interest.

The Indore process is based on the idea that soils need organic matter, and that the waste organic matter derived from the unutilized parts of farm crops, from weeds and so forth, can supply this need, provided that they are first submitted to a preliminary rotting

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process. To promote this decay, an outside source of available nitrogen and mineral matter is required, these likewise being supplied by the farm itself in the shape of "urine earth" from the cattle sheds, and wood ashes respectively. The other additions are a certain amount of cattle dung, water, and air. The compost heaps are mixed, made, watered, and turned according to a carefully considered system; and, after they have undergone hot aerobic fermentation, the resulting product is a humic powdery material that has proved itself a useful organic manure.

Having developed the system and made it work on a large scale, the most ready avenue of development turned out to be by way of the plantation industries. The need for humus is almost universal, but the necessary organization and drive required to give a new process a trial were usually found in the directorate of some plantation group in London.

Sir Albert outlined recent progress with the use of composts on coffee, sisal and maize in Kenya, on tea and sugar-cane in India. Sugar-cane, maize and sisal, each provides residues in quantity, but the remaining crops need to be supplemented from outside sources to make up the required bulk of organic matter. In some circumstances, special crops of quick-growing grasses and legumes have been employed for this; the latter, in virtue of their high nitrogen content, serve to accelerate decomposition in the heap. Some difficulty is experienced in inducing peasant farmers to adopt the new method, and the procedure is to establish demonstration centres on Government farms or with influential agriculturists.

The next step is to attack the bigger problem of the utilization of the wastes of urban communities. A beginning has been made by the Indore workers in adapting their process to this purpose, and town waste is already being converted at a number of centres in India. The most promising development, from the point of view of western nations, is reported from Nairobi, Kenya, where by the composting of town refuse and various wastes of the animal industries, a relatively concentrated organic manure is obtained, which is eagerly taken up by local cultivators.

Turning to home agriculture, Sir Albert Howard

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points out that certain existing practices are based on the composting principle. When, for example, clover or grass turf is dunged and turned over, the turf and dung are allowed to decay together. The suggestion is that, in our large areas of turf, we have a supply of potential humus that should be realized by means of composting *in situ* with dung. To provide the necessary dung, the existing manure would have to be supplemented by the incorporation of all available farm wastes into the dung heap. The place of artificials in a system based largely on humic manures would be to enrich the compost heap itself, thereby facilitating decay and grading up the final product. The ultimate disappearance of the water-borne sewage system is envisaged, to the gain of the soil in nutrients and organic matter.

Those who have what Sir Albert Howard calls the "NPK Mentality" may not agree in full measure with all his views. Some proposals are clearly for the future, and the present efficient fertilizer industry can reasonably and justly look to expansion in the role it has long occupied on most farms, namely the supplement to the home-produced animal manures. Nevertheless, the case for the salvage and utilization of organic wastes needs a strong advocate. The paper records substantial achievement, with every prospect of further development.

Further Experiments on the Control of Flea Beetles in Seed-Beds

THE following note has been contributed by Messrs. F. R. Petherbridge and I. Thomas, School of Agriculture, Cambridge:—

In 1934, the authors obtained a good control of Flea Beetles, in Brassica seed-beds in Bedfordshire, with Derris dusts*. In the same year, Miles† obtained a good control in the North-West Province with a dust consisting of 50 per cent. naphthalene and 50 per cent. silica. In Germany, a proprietary dust that consists of finely-powdered quartz, has been officially recom-

* Petherbridge, F. R., and Thomas, I.: "The Control of Flea Beetles in Seed-beds," this JOURNAL, Vol. XLI, No. 11 (February, 1935), p. 1070.

† Miles, H. W.: "The Control of Flea Beetles with a Naphthalene-silica Dust," *Id.*, p. 1079.

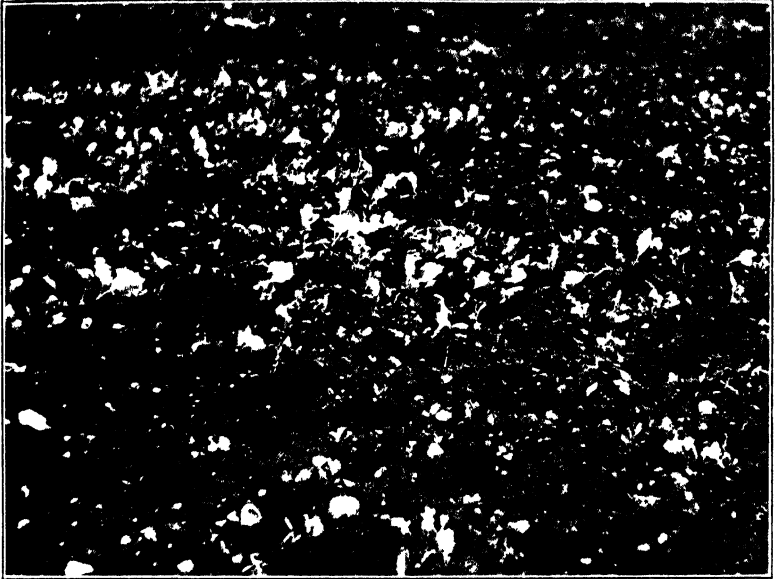


FIG. 1—Cabbage seed bed—untreated portion



FIG. 2—Cabbage seed bed—portion dusted four times with Derris dust

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mended for the control of Flea Beetles. Last year (1935) it was decided to compare the relative merits of these three treatments and the following account gives a brief summary of the results.

As in 1934, the experiments were carried out at three centres on Brassica seed-beds in Bedfordshire. The dusts were applied to duplicate plots with a rotary chest duster. The first dusting was done just as the plants were breaking through the ground, and three or four applications were given at intervals, depending on the weather. The Derris (0·2 per cent. Rotenone) and naphthalene-silica dusts were applied at the rate of about 75 lb. per acre, but the powdered quartz was heavier and required about 140 to 150 lb. per acre to give an adequate cover.

The weather was exceptionally fine and warm in early May, and at this period dusts were applied at intervals of two or three days. It was once more evident, and it must be emphasized, how important it is to keep a very careful look-out for Flea Beetle attacks in fine, warm weather.

On May 27, a count was made of the number of plants in two one-foot lengths of every drill across each plot. On July 7, at the third centre (Mr. E. M. Street) a second count was made, only plants of commercial value being counted. The results are summarized in the following tables.

Experiment I—On Christmas Drumhead Cabbage plants at Mr. T. H. Ream's farm, Sutton, Bedfordshire.—

<i>Treatment</i>	<i>Lb per acre</i>	<i>When applied</i>	<i>Av. no. of plants per foot*</i>
Derris dust ..	65·85	April 24, 30, May 5	8·7
Naphthalene-silica ..	65·85	April 24, 30, May 5	9·2
Powdered quartz ..	140-150	April 24, 30, May 5	6·8
Control ..	—	—	3·0

* Each figure is an average of 136 counts.

Experiment II—On Cauliflower plants on Mr. F. Inskip's farm, Langford:—

<i>Treatment</i>	<i>Lb per acre</i>	<i>When applied</i>	<i>Av. no. of plants per foot*</i>
Derris dust ..	65·85	April 30, May 2, 5, 9	8·9
Naphthalene-silica ..	65·85	April 30, May 2, 5, 9	8·8
Powdered quartz ..	140-150	April 30, May 2, 5, 9	6·4

* Each figure is an average of 120 counts.

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Experiment III —On Cabbage plants at Mr. E. M. Street's farm, Langford --

<i>Treatment</i>	<i>Lb per acre</i>	<i>When applied</i>	<i>Aver. no. of plants per foot*</i>
Derris dust	65-85	May 3, 5, 9, 13	1st count 11.5 2nd count 9.9
Naphthalene-silica .	65-85	May 3, 5, 9, 13	1st count 8.9 2nd count 9.0
Powdered quartz ..	140-150	May 3, 5, 9, 13	1st count 4.1 2nd count 3.0
Control	-		1st count 4.3 2nd count 2.1

* Each figure is an average of 136 counts

From these experiments, it will be seen that both Derris and naphthalene-silica dusts gave a very good control of Flea Beetles. Although the powdered quartz gave some measure of protection, the plants on these plots were often little better than those on undusted plots, and the use of this dust cannot be recommended. (At the present time the price of the Derris dust used is about 30s. per cwt. on the farm. The naphthalene-silica dust is about 25 per cent. dearer.)

As a result of these and previous experiments, the following recommendations are made :

- (1) Prepare as fine a tilth as possible
- (2) Dust with a Derris or naphthalene silica dust as the plants are coming through the ground
- (3) Subsequently, dust at intervals depending on the weather and extent of attack.
- (4) *Keep a very careful watch on the seed-beds* (during the fine weather they should be examined twice a day).

The authors are very much indebted for the facilities afforded by the growers on whose farms the above experiments were carried out

COLORADO BEETLE AT TILBURY. III.*

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Laboratory, Harpenden.*

MOST readers of this JOURNAL will already be aware that the Colorado Beetle was not discovered in the Tilbury-Gravesend district during 1935, but for the sake of readers overseas, and also to complete the record of the progress of the campaign, a brief account of the past year's operations seems desirable.

It will be remembered that when the last report was published (This JOURNAL, February, 1935) the satisfactory statement was made that no place in the country was then known to be infested by the beetle. This, taken in conjunction with the fact that only two living beetles had been found during the summer of 1934, enabled the Ministry to postpone any decision as to spraying until a full examination of the potato crops in Essex and Kent had been made during the early summer of 1935. This inspection was carried out between the middle of May and end of June. During this period, places known to have been infested during 1933-34, and the adjacent crops were kept under a continuous watch. In addition, all potato crops within six miles of an outbreak—3661 acres on 211 farms—were examined in detail and more general inspections were made up to a ten-mile radius—a further 2292 acres being visited (5953 acres in all). Finally, a general survey was made of the more distant potato-growing areas in Essex and Kent, notably those adjacent to the Thames estuary and the adjoining coasts. No trace of the Colorado Beetle was discovered, either in the neighbourhood of the places that had previously been infested or elsewhere, and in consequence the Ministry decided that no further precautionary spraying was necessary.

The work of inspection, never easy, was, however, in 1935 unusually difficult, owing to the damage caused

* Previous articles have appeared in this JOURNAL as follows. No. I, January, 1934, p 907. No. II, February, 1935, p 1058.

COLORADO BEETLE AT TILBURY—III

to the potato tops by the disastrous May frost, and in spite of the apparent absence of the pest it seemed a wise precaution to regard the whole area as still under suspicion. The danger areas in the neighbourhood of Tilbury and Gravesend were therefore kept under practically continuous supervision throughout the remainder of the season (until the foliage had died down in late summer), and, in the middle of August, a second team inspection of crops in the neighbourhood was made. Again no traces of the beetle were discovered.

As far as it is possible to ascertain, therefore, the Colorado Beetle outbreak of 1933 has been brought to an end.

The fact that the Colorado Beetle is now believed to have been eradicated from the Tilbury-Gravesend district must not, however, be taken to imply that further outbreaks are unlikely in that district or in some other area adjacent to the lower reaches of the Thames. In this connexion the following incident is important. On July 2, 1935, a living Colorado Beetle was found on a lighter alongside the Surrey Commercial Docks in London. The lighter was moored not far from two American vessels that had just arrived from ports in the Southern U.S.A. An examination of this specimen showed that it was physiologically immature and had almost certainly emerged from the pupa during the past summer—i.e., it had not overwintered as an adult. In view of the date and the weather in late spring, it was almost impossible that this insect could have been bred from the egg in England, and there is thus every reason to suppose that it had in fact arrived from America. The neighbourhood in which the insect would have found itself, if it had escaped, is obviously most unsuitable to the Colorado Beetle, but as a precaution a search was made for further specimens, without success. It should perhaps be added that neither of the American ships brought cargoes of potatoes or agricultural produce likely to carry the insect, which, it may be assumed, flew on to the boat at the last port of call in the U.S.A. and remained on board until its arrival in England. (Beetles like the Colorado Beetle do not as a rule take to wing in a strong wind, and would

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therefore be unlikely to leave the boat during its passage across the Atlantic.)

The incident is of particular interest, as it shows how easily the pest might again be introduced into the counties bordering on the lower reaches of the River Thames, which, flowing for some 14 miles through agricultural land, offers special facilities for the landing of the insect in circumstances in which it is likely to persist.

The counties of Kent and Essex are not, however, the only areas in which the Colorado Beetle is likely to be introduced. There is hardly a sea-board county from north to south that has not one or more ports used by vessels from overseas; and throughout the summer, therefore, special attention was paid to potato crops in the neighbourhood of ports, notably those ports most used by vessels from France or America. In this work, both the Ministry's inspectors and the Advisory Entomologists participated, and, in spite of a thorough search, no new outbreak was discovered.

This happy state of affairs must not, however, be expected to persist indefinitely. The invasion of Europe by the pest is progressing rapidly; France, with the exception of an area in the south-east and a smaller district in the north and north-west, may be regarded as completely occupied by it, while, during 1935, for the first time outbreaks (some thirty in all) occurred in Belgium, no doubt as a result of invasion across the French frontier. In Germany, thanks to the measures of the German phytopathological service, the outbreak at Stade, mentioned in last year's report, has been brought under control, and there is every hope that the beetle there will be completely eradicated. With the approach of the insect to the Franco-German frontier, however, it is at least probable that before long Germany will be engaged in a new campaign in the south-west.

There would, therefore, seem no escape from the conclusion that the European population of the Colorado Beetle, already very large, will become still larger, and with a species so prone to migrate the menace to Great Britain must greatly increase. It is true that the Channel, with some twenty miles of open

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sea, presents a considerable barrier to natural emigration from France to England, but even so the distance is not great enough to render it certain that, in favourable weather, beetles will not arrive by flight. Even if it could be assumed that cross-Channel flights would only occur at rare intervals, the position would be little less serious since the regular Channel steamers offer every opportunity for beetles to arrive in the same manner as that detected last summer in the Surrey Commercial Dock. If, therefore, the country is to remain free from this very troublesome pest, great vigilance is necessary, and too much stress cannot be laid upon the value of the assistance that can be given by members of the public— a form of assistance so well exemplified by the instance at the London docks, already mentioned.

MECHANIZATION IN MIXED FARMING : A CONFERENCE AT OXFORD

DURING the past few years, there have been many Conferences on various aspects of agriculture and horticulture, and it is a good sign that the attendance is often considerable, the interest displayed is keen and penetrating, and the younger generation is particularly well represented. The Conference on Mechanization in Mixed Farming that was held at Oxford on January 7-10 was lacking in none of these things, and must certainly be regarded as having worthily fulfilled its object.

The Conference was held at Rhodes House, under the joint auspices of the School of Rural Economy, the Institute for Research in Agricultural Engineering and the Agricultural Economics Research Institute. The papers covered a wide range of matters relating to the mechanization of rotational farming, problems of livestock and grass land, and harvesting on medium-sized farms. The Chairman at the inaugural dinner at Rhodes House on January 7 was Sir Charles J. Howell Thomas, K.C.B., K.C.M.G. (*Permanent Secretary, Ministry of Agriculture and Fisheries*); the opening address on the morning of January 8 was delivered by Professor J. A. Scott Watson, M.A. (*Sibthorpian Professor of Rural Economy, Oxford*); and the closing address was given by Mr. C. S. Orwin, M.A. (*Director, Agricultural Economics Research Institute*) at midday on January 10.

The papers read were as follows, in the order given :—

“Specialized *versus* Mixed Farming,” by Mr. A. Bridges, M.A., Agricultural Economics Research Institute

“Farm Rotations and Mechanized Farming,” by Dr. H. G. Sanders, School of Agriculture, Cambridge University

“Widening the Scope of the Mechanized Farm,” by Mr. Dunstan Skilbeck, M.A., School of Rural Economy.

“The Tractor on the Small Farm,” by Mr. E. D. Wolton, Waveney Lodge Farm, Burgate, Norfolk

“Row Crop Equipment,” by Mr. J. E. Newman, Institute for Research in Agricultural Engineering

“Farm Transport,” by Mr. J. R. Warburton, Shillingford, Oxon

MECHANIZATION IN MIXED FARMING

"The Place of the Horse in Mixed Farming," by Mr. W. S. Mansfield, M.A., University Farm, Cambridge.

"Live Stock in relation to the Mechanized Farm," by Mr. W. D. Hollis, Leckford Estates, Ltd., Stockbridge, Hants.

"Folding Systems," by Mr. W. S. Abbott, Sacrewell, Thornhaugh, Peterborough.

"Mechanization and Grassland Improvement," by Dr. G. H. Bates, Staffordshire Farm Institute

"Long Leys and Mechanized Farming," by Professor R. G. Stapledon, C.B.E., Welsh Plant Breeding Station, Aberystwyth.

"Grass Conservation," by Mr. H. J. Page, M.B.E., B.Sc., Imperial Chemical Industries, Ltd.

"Grass Drying on my Farm," by Mr. Clyde Higgs, Hatton Rock, Stratford-on-Avon.

"Small Combines," by Mr. J. E. Newman

"Labour Saving without Combines," by Mr. T. Wannop Williamson, B.Sc., Agricultural Organizer for North Hampshire.

"Gran Storage," by Dr. H. J. Denham, Director, Institute for Research in Agricultural Engineering, and Dr. K. A. H. Murray, Agricultural Economics Research Institute.

In his inaugural address, Sir Charles Howell Thomas said that in his judgment the significance of the Conference was two-fold. In the first place, it reflected the growing interest of the farming community in the subject of mechanization as a means of reducing the costs of production and of increasing the efficiency of agriculture. Secondly, it was an example of real and fruitful co-operation of the kind that was becoming more and more necessary. The three Institutions participating in the Conference represented the agricultural, engineering and economic sides, none of which, in approaching the subject of farm mechanization could properly be considered apart from the others.

The subject of mechanization was one of the greatest interest and importance to all farmers, and during the period since the Great War many aspects of our country's husbandry had been revolutionized by the irresistible incursion of the machine. Rotary cultivation and combine harvesting, to quote but two examples, represented developments that had taken place almost within the present decade, but they had already become a definite part of modern farming methods in many districts.

On behalf of the Ministry of Agriculture and of those present, he extended warm congratulations to the University itself and to the three Departments of the University who were responsible for the holding of

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the Conference. He wished it all success in the conviction that its deliberations would benefit from the atmosphere of an ancient seat of learning that was giving evidence yet further of its ability to keep pace with rapidly-changing times and to maintain its influence upon the nation's life; and expressed the hope that it might be the forerunner of further developments that would contribute to the health and prosperity of farming.

In welcoming well over 200 members of the Conference, Professor Scott Watson observed that mechanization promised to be the most important factor in producing more human food with less human toil. The output of British farming had increased by some 10 per cent. during the last thirty years. A bigger market was the only way to avoid rural depopulation. For general purposes the tractor could beat the horse by a wide margin. We needed to use power economically for handling and carting muck; for the small as well as the big farm; and for intensive and diversified as well as for specialized farming. We required to accomplish three things: (1) to make the grass lands more productive by adopting a more active and energetic policy of grassland management; (2) to improve the quality of the herbage so that we could reduce the need for supplementary foods for intensively-fed animals; and (3) to preserve the grass and make it available for intensive production in winter as well as in summer. We needed not only more grass, but richer grass, and to convert it into something better than the normal hay, sunshine or no sunshine.

Professor Watson reviewed the question of the influence of combines, grain-driers, economic employment of labour, preservation or use of straw, storage, orderly marketing, increased production per acre, rural depopulation and farm wages. With higher production and less toil there should be benefits for everyone—cheaper food for the consumer; better wages and more leisure for the farm worker, together with escape from his most back-breaking jobs; and a residue in the shape of more adequate profits for the farmers. It was becoming unnecessary and uneconomic to carry foodstuffs half-way round the world; as production was becoming cheaper it should come nearer

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to the consumer. It was likely that many would see their fifty-year-old pastures ploughed out in favour of a more intensive type of farming.

Specialist Corn Growing and Mixed Farming in Relation to Mechanization.—Mr. Bridges said that there is some doubt whether mixed farms, which are typical of most English farming, can be so fully mechanized as the specialist grain farms. The main features of these diversified farms are the provision of an even distribution of work throughout the year, a rotation of cropping designed for checking disease and maintaining the cleanliness of the land, and the keeping of stock to utilize by-products and to maintain the fertility of the soil. The introduction of machinery, which has as its aim the displacement of labour and the heavy capitalization involved, created special problems for the mixed farms.

By full mechanization he implied the use of tractor power for all tillage and harvesting operations, the employment of the combine for harvesting grain and the use of the dryer. Horses may not be used, or at most one or two may be employed as auxiliary sources of power.

Mechanization of this extent has been applied to arable farming in two ways :—

(1) By farmers taking over bare farms and specializing in grain production with some minor crops

(2) By farmers on mixed farms by substitution for older methods of working the land and harvesting the crops, and by changing the kinds of crops grown

There is no great difference in soils, topography, and other features of environment between the two kinds of farms which would affect the extent of mechanization or the carrying of livestock. The fields are usually large, giving full scope for machinery.

Mr. Bridges discussed the two types of organization under the heads of (1) labour, (2) utilization of land, (3) stock, and (4) capitalization; and he concluded that :—

(1) The corn specialist has a simple system of farming, and so far as can be judged it is a reasonably profitable system at the present time. Its weaknesses are the large fallow area and a very uneven distribution of labour. It provides very little productive work in the winter months. It is difficult to see how these defects can be remedied, without introducing some form of livestock. The feeding of bullocks or sheep in winter and early spring would fill the gap better than any

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other class of stock, creating work for men, giving an opportunity of disposing of hay grown in the fallow break and of some of the straw that is now almost a dead loss. It would also remove the objections to the absence of animal manure for maintaining soil fertility. The idea for the specialist mechanized farm is a system of stock keeping, which involves the need for the dung cart.

(2) Full mechanization of grain growing has been adopted and all classes of stock are being carried, without any conflict of interests, on farms large enough to utilize mechanized equipment to the full and at the same time to provide sufficient land for the needs of the stock.

(3) For most English arable farms ranging between 300 and 500 acres full mechanization would imply specialization at the sacrifice of one or more forms of livestock—because the farms are not generally large enough to hold all forms of enterprise in an economic form.

Farm Rotations in Mechanized Farming.—Dr. Sanders observed that to our forefathers a rotation was a rigid thing, departure from which was regarded with the gravest misgiving and was, in fact, expressly forbidden by the terms of many leases. If one postulates settled conditions and allows for the natural anxiety of landlords before nitrogen could be purchased in a sack, it is easy to justify this attitude; nevertheless the farmer won freedom of cropping during the first decade of this century, whilst since the war conditions have been anything but settled. The principles underlying rotations are so fundamental that mechanization hardly affects them, and therefore we must look for only minor modifications. Dr. Sanders then briefly discussed the well-known principles to which he had referred, saying that a rotation is not merely a matter of crop husbandry; it is, as it were, the warp of the farming pattern, the stock policy being the woof. The interdependence of crops and stock tends to make the farm self-sufficient.

The well-established principles underlying rotations are fully capable of taking mechanization in their stride, and it is unlikely that the farmer will go far wrong if he bases his cropping sequence upon them; the combine pioneers flagrantly flouted them, but experience has already shown that this cannot be done with impunity.

After discussing rotations involving two straw crops and fallow, or two straw crops and "seeds," Dr. Sanders pointed out that they may be appropriate for mechanized farming, but are quite unsuitable for mixed farming. Even in the absence of stock they have been weighed and found wanting, whilst with the

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introduction of stock (or with the incorporation of combines with mixed farming) they will be quite inadequate. Provision of stock food will again become important, and though the newer folding methods may be used on some farms, stock will generally mean farmyard manure—and the mechanization of muck carting should not defeat our engineers. Where farmyard manure takes its rightful place in the system high value crops must be introduced to bear the cost of its application; it might also be pointed out that farmyard manure will make the growing of such crops possible. The first high-value crop to suggest itself is sugar-beet, and the implements needed to mechanize its growing are relatively inexpensive; the trouble arises in harvesting the crop.

There seems to be no sufficient reason why any crop should be excluded from a mechanized farm, and rotations will be determined by agricultural rather than engineering considerations.

The possibility of alternate husbandry needs consideration: the advantages of the long ley system include the accumulation of fertility in the leys, the cashing of this fertility in the arable crops, the control of weeds, pests and animal diseases, the excellence of the grassland, the admirable fluidity of the whole system. Its adoption could be widely extended with advantage.

Widening the Scope of the Mechanized Arable Farm.—Mr. Dunstan Skilbeck felt that farming is a very personal job, and any arguments from the particular to the general are, with some justification, inclined to be discountenanced by the men of practice. So widely varying are the potentialities of soil, of climate, and so much does the adaptability of the farmer himself vary that it is out of the question to lay down categorically any system of husbandry for any place or for any individual.

He did not believe that the mechanization of English arable land should necessarily, or even does necessarily, mean the turning of the land of England into something comparable with a Middle West prairie farm. The machine in agriculture must be adapted to our needs and not the needs of the nation to fit the machine. The machine is essentially something to make labour

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more economically applicable; it inevitably causes changes in methods of production, but how sweeping these changes need be is still questionable—the machine is still in a process of rapid evolution.

Mr. Skilbeck gave an account of the problems associated with two adjacent holdings owned by St. John's College, Oxford. With profit as the main concern the farm was in the first instance equipped for mechanized wheat production with the necessary tractors, implements of tillage, combine harvester and corn-drying plant, and the general plan of campaign outlined was to rely upon bare fallows to clean the land, relying entirely upon inorganic fertilizers for the maintenance of fertility.

Various changes have followed in the three years since operations began: a piggery has been added; market garden crops followed in order to use the dung; crop row cultivation is in sight to save labour; and changes in cereal growing are being made in favour of barley; and the bare fallow is to be reduced by the introduction of short-term leys. Other possibilities are grass drying—a corn drier already exists—and poultry folding.

The Tractor on the Small Farm.—Mr. E. D. Wolton's paper dealt in the main with the minimum mixed acreage on which a tractor can be economically employed and the uses to which it can be put. Tractors had certain advantages over the horses :—

A tractor enables one man enormously to increase his output, through its speed and immunity from physical fatigue; its mobility when weather conditions are most suitable, so that farmers are less dependent on settled weather and thus acquire a reserve of time; a tractor-man rides while the horseman walks, and as riding is less tiring than walking, there is never any trouble about working overtime; the tractor-man has only to "cover up" when he can see no longer; a broken part can usually be replaced without much loss of time, but this does not apply to a horse's broken leg; in small fields there is only half the turning with a tractor, as it takes two furrows compared with the horse's one; while the tractor never stops, and less time is wasted.

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Mr. Wolton stated that his tractor, on a farm of 150 acres :—

- (1) ploughs all the land, including opening and shutting furrows ;
- (2) cultivates and breaks down the land for drilling ;
- (3) drills and harrows (or rolls) in one operation ,
- (4) rolls and harrows in one operation ;
- (5) loads all hay by pulling wagon and hay-loader ,
- (6) draws all full loads to hard road ;
- (7) draws binder and so cuts all corn ,
- (8) loads all rakings with the hay-loader ,
- (9) grinds corn ; and
- (10) carts dung

Row-Crop Equipment.—In introducing this subject, Mr. J. E. Newman pointed out that the advantages of row-crop tractor work are the same as those of other tractor operations—more work done per man employed and a greater speed of working helped by ability to work long hours when necessary. The work is superior to horse work, since the wheels cause fewer casualties to the plant population than do the horses' feet, and as the implements pulled are often of a heavier construction they run at a more even depth. Row-crop equipment naturally falls into two main divisions : (1) the tractor, and (2) the tools used with it. A tractor suitable for row-crop work should have a very short turning radius, high clearance, adjustable wheel centres, independent braking of either back wheel, and narrow wheels.

Mr. Newman dealt with various aspects of these several points, types of wheels, power required, tools most suitable for different classes of work, and generally with the advantages of row-crop cultivation.

Farm Transport.—In this paper Mr. J. R. Warburton considered the most suitable and desirable and economic forms of farm transport.

At first sight farm transport does not seem either a very large or a very difficult part of farming, but it wears a different aspect when one considers the vast amount of produce that has to be moved to and from the fields in the course of a year. If the transport of produce and manures to and from the land all took place over metalled roads, the problem would be easy, but as fully 75 per cent. of it takes place over plough land, stubble, or rough farm roads, the matter becomes far more complicated.

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Mr. Warburton reviewed the subject generally—carts, trailers, trucks, track-laying tractors, etc., and gave various figures indicating differences in draught; and he outlined experiences on his own farms.

Summing up, Mr. Warburton made the following recommendations for the improvement of farm transport :—

(1) To any farmer whatsoever, grass or arable, poultry or market garden, he advised that carts should be put on pneumatic-tyred wheels with roller bearings

(2) Apart from farm carts, he was of opinion that many other implements could be fitted with pneumatics with great advantage

(3) For the farmer who has a large farm of 400 acres or over he would recommend a 4-ton trailer on four pneumatics, with a standard tractor fitted with pneumatic tyres. Even better would be the same trailer pulled by a track-laying tractor.

(4) Finally, the sledge may be considered, but, of course, solely for use in the fields themselves. Its advantages are in low loading and low initial costs

The Place of the Horse in Mixed Farming.—Mr. W. S. Mansfield said that he believed it to be possible to-day to dispense with horses entirely on almost any soil and under any system of farming. It is also possible to propel a perambulator with a traction engine! The practice is, however, unusual, as it is not generally considered to be advantageous. The point was that we must consider, not whether the horse can be replaced by the tractor, but how far can it be replaced advantageously and profitably. Mr. Mansfield then discussed the relative merits of horses and tractors in performing various operations, and concluded by saying that he honestly could not see how he could profitably farm the 600 acres of heavy clay that are included in the Cambridge University farm without a team of horses, though he must add that he could not see how he could farm it without the assistance of a tractor.

Stock in Relation to Mechanized Farming.—Mr. Hollis recognized the controversial nature of his subject, and dealt with two questions :—

(1) Can mechanized farming (i.e., almost continuous corn growing) be carried on successfully and for any length of time without stock?

(2) Can stock be profitably incorporated in a policy of mechanized farming?

Discussing the questions from various aspects he found that the answer to the first question must be No, and to the second Yes.

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Folding Systems.—Mr. Abbott observed that sheep-folding, as is well known, forms an important link in the traditional four-course system, and it was in an effort to break away from this beautiful, but nowadays unprofitable, system, which has no place for either pigs or poultry, and to introduce these two classes of livestock into the general economy of an arable farm, that the systems he proceeded to describe were developed. He then dealt with the methods of folding, management, housing and equipment, capital and results in relation to the folding of poultry and pigs.

Mechanization and Grassland Improvement.—Dr. Bates pointed out that the improvement of grassland by mechanical means is not an innovation of recent years, for records can be found of the practice having been carried out by a few individuals during the last century. The majority, however, regarded any interference with the existing turf as harmful. In recent years, however, the subject has received very wide attention. Mechanical improvement resolves itself into three major processes, as follows :—

- (1) The eradication of mat.
- (2) The transformation of the flora of the pasture from an association of bent, sheep's fescue, and woolly soft grass to one in which the dominant species will be perennial rye-grass, smooth-stalked meadow grass, and wild white clover, or the maintenance of this latter association as the dominant one. This process was for convenience be termed "rejuvenation"
- (3) Routine operations for the spreading of dung and molehills and the removal of long coarse grass.

Dr. Bates dealt very thoroughly with each of these questions in turn.

Long Leys and Mechanized Farming.—It may be said that Professor Stapledon's paper constituted an indictment of the present condition of grass land through the length and breadth of the land, and emphasized the fact that so much more may easily be obtained from the same land under a system of (variable) temporary leys.

He stated that the truth is, and nobody can deny it, that by far the larger proportion of our permanent pasture is bad—unproductive, innutritious, full of weeds, seldom yields what we want and only when we do not want it. "As the result of a survey we have

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recently conducted, it transpires that, of the 2,130,000 acres of permanent pasture in Wales there are not 50,000 acres in something approaching to tolerably good rye-grass pastures." The proportion in England would be higher.

Professor Stapledon dealt whole-heartedly, and with his usual artistic enthusiasm, with the whole matter, showed how changes might be effected, and how the new grass-drying might be utilized; and he detailed four distinct advantages that the four- to six-year ley gives to the grassland farmer.

- (1) A system of ley farming enhances the fertility of the whole farm.
- (2) Except on the very best land (and for aught anybody has proved to the contrary it may be true of the very best land also) leys are more productive than permanent grass on the same land.
- (3) The ley is valuable for cleaning up a foul farm.
- (4) The ley affords scope for producing just the grass you want just when you want it— and this is the prime function of the ley in connexion with drying grass.

In concluding Professor Stapledon referred to the provision of seeds as a matter of cardinal importance, and urged farmers to grow their own—for themselves and for one another.

British farming was probably entering upon the greatest revolution of its long and chequered history. "The future definitely lies with the engineer and the implement maker, and the most successful farmer will be he who dispenses as far as may be possible with everybody else. He will come to have small use for the feeding-stuff merchant, but little use for the seeds merchant, and he may well come also to be decreasingly dependent upon the manure merchant. There has never been such an exciting prospect for the farmer, who at heart is the most independent man in the whole wide world, and who at heart is a cultivator rather than a shopkeeper"; and the *Oxford Dictionary* informs us that "to be a farmer" is to "to till the soil."

Grass Conservation.—In this paper, Mr. Page gave a lucid account of this new and important subject, which was perhaps the most interesting side of the Conference and necessarily formed some part of a number of the papers. He dealt with hay and hay-making, young grass, composition, nutritive values, ensilage, artificial drying of young grass, storage, feeding trials, and other matters. After remarking

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that the use of dried grass is now ripe for development in British farming, because we know that it is a first-class product able to replace, and more than replace, other concentrates, Mr. Page concluded his paper by saying that although dried grass must be given pride of place, it and grass silage must be regarded not as mutually exclusive but as complementary methods of conservation.

Grass Drying on My Farm.—Mr. Clyde Higgs gave a highly interesting account of his own experiences relative to grass drying, his three farms covering 700 acres.

Three reasons which had always kept him interested in some method of conserving grass are :—

(1) The colossal waste which occurs at all times of the year and especially with a tested herd where it is impossible to buy and sell stock freely.

(2) The dependability on the weather for haymaking

(3) With a large herd any method which will show a reduction in the food bill is very welcome.

Mr. Higgs dealt with his grass-drying installation, cost of drying, and other matters. His costs came to £1 17s. 6d. per ton of dried grass. His programme for 1936 is ambitious but capable of achievement. It is to do away with haymaking altogether and dry the lot. Two large Billingham driers have been installed, and the total output should be nearly 1,000 tons. The product will be sorted into three lots :—

(a) High quality grass for heavy yielding cows,

(b) for low yielding cows and rearing stock; and

(c) for dry cows and the small amount of bulk, if necessary for the high yielding cows

Mr. Higgs believed that commercial grass drying for the farmer has arrived and represents one of the greatest advances in agriculture for centuries.

Small Combines.—Mr. Newman gave a most useful account of combine-harvesters, with their adjuncts—driers and balers; and he referred to the question of the relative advantages of combining and ricking, as well as the types and sizes of farms on which a combine may prove of value. Grass drying links up well with combining, since the grass drier can be used, when it is necessary, to dry the grain. Apart from that possibility of the near future, it is obviously necessary that a drier to serve a cheap

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combine should itself be cheap. Driers costing several hundred pounds are out of the question. There are three other solutions to the problem: (1) not to use a drier at all but to leave the drying to the miller who buys the wheat, though this solution obviously could not be adopted universally; (2) to use the combine only in favourable weather, and to use the binder at other times; to use a cheap and simple drier, even if it requires more labour to operate it.

The best solution is to use a grass drier and dry the grain on it. The grain harvest comes at a time when the drier would not be wanted for grass.

Possibilities of Saving Labour in Harvesting Without Combines.—In this paper, Mr. Wannop Williamson considered a variety of means by which very considerable saving of labour may be effected without using a combine for harvesting. His conclusions were that a saving of labour in those areas where standard practice is obligatory must be sought in detail improvements only—with tractor, power take-off binder, pneumatic-tyred vehicles, and Dutch barn worthy of most attention; while, in the south, speedy collection on trailers, and, where straw is of little importance, the grain-drier, offer most opportunities of cutting down labour costs.

Grain Storage on the Farm.—Dr. Denham pointed out that the disadvantages of storing grain in the rick have long been recognized, and in recent years even the advantages of the system have been called in question. The art of rat-proofing a rick is becoming a thing of the past, and to-day there are more steddle stones in bungalow gardens than in rick yards.

The disposal of grain threshed at harvest time depends very largely on the financial circumstances of the farmer. Few farms are adapted for the storage of grain in the sack, and most of the great barns were originally intended for the storage of grain in the sheaf, to be threshed by the flail during the winter months. It is safe to say that the problem of sack stowage and sack handling on a labour-saving basis has never been tackled as far as the farm is concerned, and few farmers are aware of the existence of the sack

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hoists, runaways, and chutes commonly used in other industries.

The design of grain storage installations for the farm is essentially a matter for the expert engineer. Since in the majority of instances existing buildings must be used, and the individual characteristics of the farm and its acreage must be taken into account, there is no possibility of a standard lay-out, and even some of the items of equipment, such as the drier and its accessories, may require modification to suit their surroundings.

In reviewing the problem of grain storage, the question of cost inevitably arises. In this country there is as yet hardly enough material from which to draw any deductions, in view of the great diversity in conditions.

It may well be asked why it should be incumbent on the actual producer to provide storage for his crop. Why, for instance, should we not follow the example of the Middle West, and develop co-operative granaries in the main wheat and barley areas of this country? To establish similar granaries in England would, at the moment, be impossible without a subvention from the State. It is known that similar proposals were considered by the Government a few years ago, and to-day, when national emergency succeeds national emergency with ever-increasing rapidity, the country might do well to consider whether the meagre supplies of wheat in the country (held for the most part in highly vulnerable units at the great ports) should not be augmented by a series of country granaries capable of dealing with the grain production of their respective neighbourhoods.

Grain Storage.—In this paper, Dr. Murray dealt with the problem of wheat storage in this country, where it has never been so urgent as in the large grain-exporting countries, although its significance has increased considerably in the last few years. Various factors have resulted in the bulk of the wheat being stored on the farm. The increase in mechanization and the passing of the Wheat Act have resulted in better harvesting, earlier threshing, and heavier marketing. These factors have, therefore, brought

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the problem of grain storage, for wheat at any rate, into the forefront.

Regarding wheat, Dr. Murray dealt with three questions :—

(1) What are the regular month-to-month fluctuations in the marketing of British wheat ?

(2) Is there a regular variation in wheat prices throughout the season ? and

(3) if so, to what extent is this price variation affected by the volume of British wheat sales ?

The Discussions were a source of very considerable interest, the exchange of views and practical experiences being mutually extremely helpful as between farmer and farmer, and farmer and technician. The large number of farmers who took part was significant of the practical importance attached to grass drying, temporary grass, corn growing and mechanization, transport, row-crop cultivation, and in particular the ultimate economic effect of such extensive grass drying as seems to be visualized by some of the speakers.

The Conference concluded with a general summing up on the part of Mr. C. S. Orwin, Director of the Agricultural Economic's Research Institute. He observed that the horse superseded the ox, and the internal combustion engine was merely a further evolutionary stage in which the horse was being largely replaced. Yet the ill-considered use of mechanical power would throw any farming system out of gear. He referred to the tendency to deride specialization, but specialization was essential if one was to take advantage of new processes. We had hardly begun to realize the future of tillage with the aid of mechanical power.

[*Note.—A full Report of the Conference papers will be published from the Institute for Research in Agricultural Engineering, Parks Road, Oxford. The price to subscribers to the Conference will be 2s. 6d. The price to non-subscribers has not yet been fixed.*]

THE CONTROL OF PLUM SAWFLY (WITH A NOTE ON THRIPS DAMAGE)

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IN the plum plantations of Cambridgeshire and Huntingdonshire, and in certain other districts in the Eastern Counties, the Plum Sawfly (*Hoplocampa flava*, L.) caused serious losses in the years 1933 to 1935 and is now responsible for bigger losses than any other plum pest. Observations in these districts show that the incidence of this pest is exceptionally variable, and that a severe outbreak in one season may be followed by a mild attack.* The varieties that have suffered most from sawfly attack are Czar plums and Damsons, and those that suffer least are Monarch and Pond's Seedling.

Sprengel† has carried out a number of experiments on the control of this pest in Germany, where she obtained a good control with an arsenical spray 8 days after petal fall and again 8 days later. She obtained better results by the addition of nicotine sulphate. The following experiments have been carried out by the writers during the past three seasons.

Experiments in 1933: *Experiment 1.*—This was carried out on thickly-planted Czar plums over 20 years old, belonging to Mr. M. H. Ivatt, Cottenham, Cambs. The first blossoms of Czar opened about April 3, and on April 7, when 50 per cent. of the blossoms were opened on some of the trees (these were now apparently in full bloom), adult sawflies were fairly abundant. Fifteen sawflies were collected from one large branch on April 7, by far the largest number the writers have ever found on one branch.

A few petals were falling on April 10, 60–70 per cent. of them had fallen on April 17, and there were

* Details concerning the life history may be found in "The Biology of the Plum Sawfly (*Hoplocampa flava*, L.) with notes on control experiments," by Petherbridge, Thomas and Hey, in *Ann. App. Biol.*, XX, No. 3, pp. 429–438.

† Die Pflaumensägwespen: L. Sprengel, *Zeit. für ange. Ent.*, XVI, I.

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still a few left on the trees on April 21. On May 1, the "cots" (= receptacles) were beginning to split. A number of eggs were found on April 17; one larva was found on May 2 and a number of larvae on May 4. The spray used was:—

Nicotine sulphate ..	..	..	..	10 oz.
Lead arsenate paste ..	..	..	..	3 lb.
Proprietary spreader ..	..	..	..	3 pints.
Water	..	..	..	40 gal.

This was applied by means of a hand pump giving a pressure of about 90 lb. and a nozzle giving a fairly coarse spray. About 2 gal. of wash were used per tree.

Two blocks, containing 18 and 21 trees respectively, were sprayed on April 26 and again on May 4. Two rows of Czar, one on each side of a path leading to the main plantation, were also used for experiment. Six trees were sprayed on May 4 and again on May 11, and 6 trees on May 11 only.

On May 25 and 26, when the plums which had set were from 0·7 to 1·0 in. in length, a count was made of the sound plums and of those injured by the sawfly larvae (Fig. 1) on both the lower and upper branches of the trees. Table I gives the results obtained.

TABLE I

<i>Treatment</i>	<i>Dates of spraying</i>	<i>Total plums counted</i>	<i>Percentage damaged by sawfly</i>
Control	—	1,400	62·8
Nicotine sulphate, 10 oz.	April 26 } & May 4 }	1,878	17·6
Lead arsenate paste, 3 lb.			
Spreader			
Water, 40 gal ..			
Control	—	1,500	43·4
Nicotine sulphate, 10 oz.	May 4 } & May 11 }	1,200	12·8
Lead arsenate paste, 3 lb.			
Spreader			
Water, 40 gal ..			
Ditto	May 11	800	39·0

The trees in this experiment were very variable in size and shape, so that a strict yield comparison could not be taken. The bending of the lower branches indicated that the sprayed trees carried a much heavier crop. The grower is satisfied that the crop from the trees sprayed twice was at least double that on the unsprayed trees.

Experiment 2.—This was carried out on thickly-planted Czar trees about 20 years old, belonging to Mr. A. Norman, Cottenham. These trees were one day

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later in coming into bloom than those used in Experiment 1, and about 10 per cent. of the blossoms had opened on April 5.

The wash used was similar to that used in Experiment 1, and was similarly applied. About $1\frac{1}{2}$ gal. were used per tree.

A few petals were falling on April 10, and on April 17 about 50 per cent. had fallen. On April 27 there were still a few petals left on the trees. *A few of the "cots" had split on May 2*, when two sawfly larvae were found. On May 6 numerous larvae were present. Two rows containing 17 trees were sprayed on April 24 and again on May 4. On April 27 and again on May 6 a similar block of 27 trees was sprayed. On May 6 one row of 8 trees was sprayed. On May 26 and 27 a count was made of the sound plums and those injured by sawfly larvae on both the lower and upper branches of the trees. Table II gives the results obtained.

TABLE II

<i>Treatment</i>	<i>Dates of spraying</i>	<i>Total plums counted</i>	<i>Percentage damaged by sawfly</i>
Control	—	3,000	30.3
Nicotine sulphate, 10 oz. } Lead arsenate paste, 3 lb } Spreader } Water, 40 gal }	April 24 } & May 2 }	1,700	7.2
Ditto	{ April 27 } & May 6 }	1,200	9.3
Ditto	May 6	700	12.3

Experiment 3.—This was carried out on large Czar trees over 20 years old, belonging to Mr. C. Warren, Wilburton.

TABLE III

<i>Treatment</i>	<i>Dates of spraying</i>	<i>Total plums counted</i>	<i>Percentage damaged by sawfly</i>
Control	—	600	15.8
Nicotine sulphate, 10 oz. } Lead arsenate paste, 3 lb. } Spreader } Water, 40 gal. }	April 21 } & May 4 }	2,000	5.0
Ditto	May 4	600	4.8
Control	—	800	27.4
Nicotine sulphate, 10 oz. } Lead arsenate paste, 3 lb. } Spreader } Water, 40 gal. }	April 26 } & May 6 }	2,000	9.0

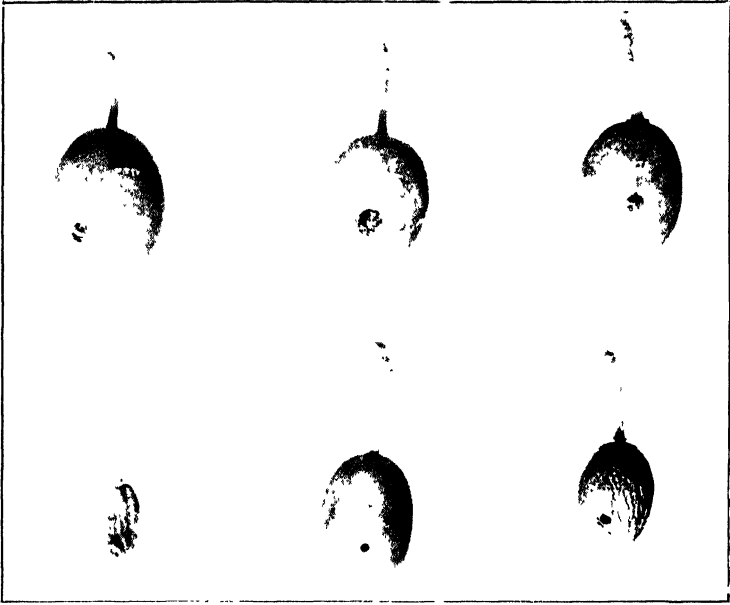


FIG. 1. Czar Plums showing holes made by Plum Sawfly larvae.



FIG. 3. Czar Plums at the time of marketing showing light blotches caused by early Thrips attack. (Photo July 20, 1933)

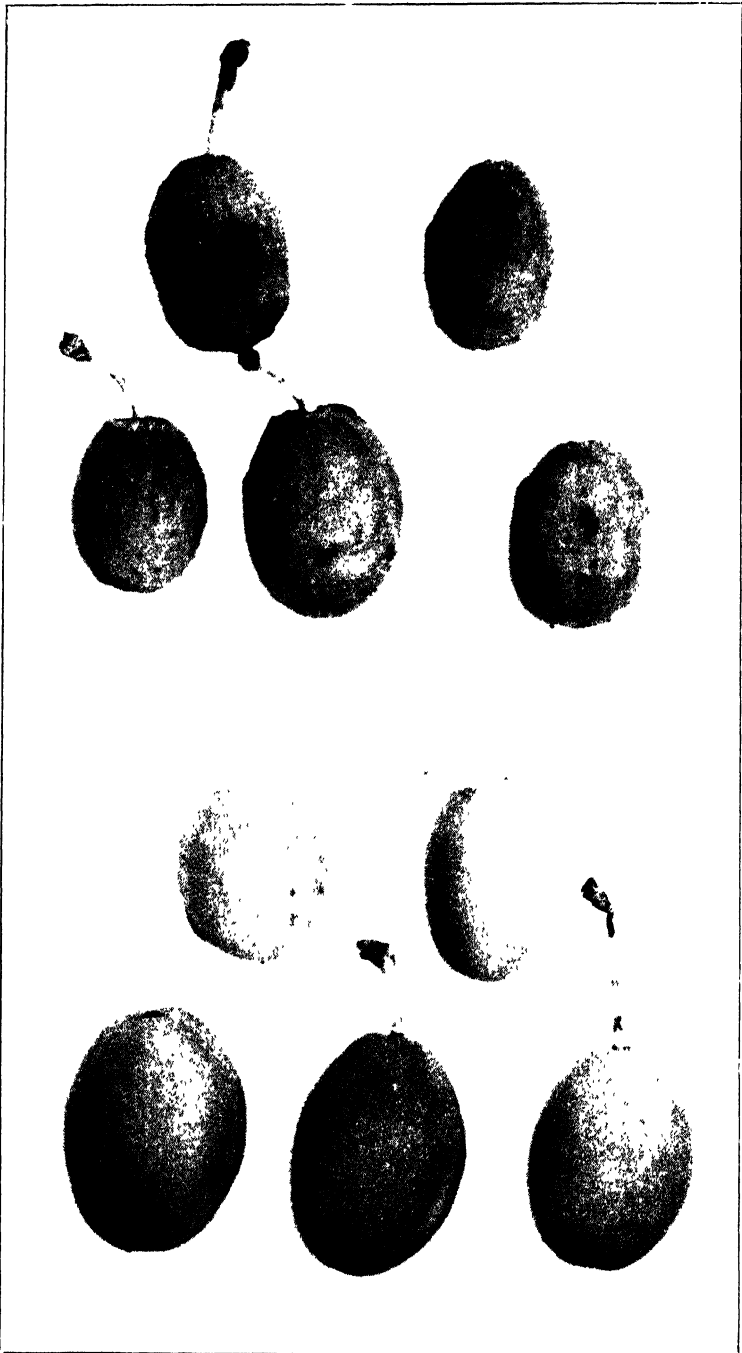


FIG. 2 — Czar Plums, showing injury by Thrips as compared with clean plums. (Photo June 26, 1933)

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The wash was similar to that used in the previous experiments and was similarly applied by the grower, from written instructions. The trees were apparently in full bloom on April 7 (actually about 50 per cent. of the blossoms were open). On April 21 when the first spraying was done there was still some blossom on the trees, and adult sawflies were still present. The first larva was found on May 1.

Experiment 4.—This was carried out on large thickly-planted Damson trees about 20 years old, belonging to Messrs. Wilkin and Sons, Tiptree, Essex, who carried out the spraying from written instructions. The trees were in full bloom on April 20 and most of the petals had fallen by April 26. Three treatments were carried out on May 3, and again on May 10 on three blocks of trees, with over 50 trees in each block. Twenty trees were left as controls.

Treatment 1 —Lead arsenate powder, $1\frac{1}{2}$ lb
 Spreader
 Water, 40 gal

Treatment 2 --As treatment 1, plus nicotine sulphate, 10 oz.

Treatment 3 —Derris, $\frac{1}{8}$ lb
 Spreader
 Water, 40 gal.

On May 22, a count was made of the sound damsons and those injured by sawfly on both the lower and upper branches of the trees. Table IV gives the results obtained.

TABLE IV

<i>Treatment</i>	<i>Dates of spraying</i>	<i>Total damsons counted</i>	<i>Percentage damaged by sawfly</i>
Control	—	1,500	16.7
Lead arsenate powder, $1\frac{1}{2}$ lb	May 3 & May 10	1,000	13.2
Spreader			
Water, 40 gal.			
Nicotine sulphate, 10 oz. ..	May 3 & May 10	1,400	6.5
Lead arsenate powder, $1\frac{1}{2}$ lb			
Spreader			
Water, 40 gal.	May 3 & May 10	1,400	5.2
Derris, $\frac{1}{8}$ lb			
Spreader			
Water, 40 gal.			

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Experiment in 1934.—In 1934, a further experiment was carried out in the Cottenham orchard, on Czar plum trees similar to those used in 1933. On April 18 a few blossoms were open and the trees were approaching full bloom (about 25 per cent. of the blossoms were open) on April 20; about 80 per cent. of the blossoms were open on April 24, and by May 6 80 to 90 per cent. of the petals had fallen. Adult sawflies were first found on April 19.

The trees were sprayed twice with an interval of a week, the first spraying being done *on May 15 when the "cots" were beginning to split*; no larvae was found on this date but attacked plums and newly-hatched larvae were found on May 17. On May 15 the following sprays were applied :—

(1)	Nicotine sulphate	..	..	..	10 oz.
	Lime-sulphur	..	..	..	$\frac{1}{2}$ gal
	Lead arsenate paste	..	..	..	3 lb
	Sulphonated loral	..	..	..	$\frac{1}{2}$ lb.
	Water	..	..	..	40 gal
(2)	Nicotine sulphate	..	..	..	10 oz.
	Proprietary spreader	..	..	..	3 pints.
	Water	..	..	..	40 gal
(3)	Derris	..	..	..	$\frac{1}{2}$ lb
	Proprietary spreader	..	..	..	3 pints
	Water	..	..	..	40 gal

The trees were sprayed with a hand pump at a pressure of about 90 lb., using fairly coarse nozzles. Each plot, which consisted of 14–16 trees in three rows, received 40 gal. of wash. The sprayed plots were separated by at least three rows of control trees.

The same trees were sprayed again on May 22, but this time 3 lb. of lead arsenate paste were added to mixtures (2) and (3).

On June 14, a count was made of sound plums and those injured by sawfly larvae; the results are given in Table V.

It will be seen that all treatments gave a considerable reduction in the percentage of plums attacked, but the best result was given by treatment (1) which included lime-sulphur, and these trees carried a heavy crop. On June 14, however, it was noticed that the trees sprayed with this mixture had suffered considerably from spray damage and a large number of leaves had fallen. Leaf drop continued throughout the summer

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TABLE V

<i>Treatment</i>	<i>Dates of spraying</i>	<i>Total plums counted</i>	<i>Percentage damaged by sawfly</i>
Control	—	6,000	22.9
Nicotine sulphate, 10 oz.	May 15 & May 22	3,000	2.0
Lime sulphur, $\frac{1}{2}$ gal			
Lead arsenate paste, 3 lb			
Sulphonated loral, $\frac{1}{2}$ lb.			
Water, 40 gal. ..	May 15 & May 22	3,000	7.3
Nicotine sulphate, 10 oz.			
*Lead arsenate paste, 3 lb.			
Proprietary spreader, 3 pints			
Water, 40 gal. ..	May 15 & May 22	3,000	5.7
Derris, $\frac{1}{2}$ lb. ..			
*Lead arsenate paste, 3 lb			
Proprietary spreader, 3 pints			
Water, 40 gal ..			

* Lead arsenate was not included on May 15

and eventually the plums fell off prematurely, the trees failing to bring up the crop satisfactorily.

Experiments in 1935: *Experiment 1.*—This was carried out at Cottenham in the same orchard as the previous experiments. The trees sprayed were Czar plums on either side of a long pathway, and were selected because of their susceptibility to sawfly attack. They were in full bloom on April 15 and adult sawflies were caught on this date. On April 26 all the petals, except for a few late ones, had fallen. *On May 3 a few cots had split* but no sawfly larvae were found.

The trees were sprayed on May 3 and again on May 10, a hand pump giving a pressure of about 90 lb. being used, as in the previous experiments at this centre. The following mixtures were used:—

- (1) Nicotine sulphate 10 oz
Sulphonated loral $\frac{1}{2}$ lb.
Water 40 gal.
- (2) Derris $\frac{1}{2}$ lb
Sulphonated loral $\frac{1}{2}$ lb
Water 40 gal.

Sixteen trees were sprayed with 40 gal. of the nicotine sulphate wash, and 40 gal. of the Derris wash sprayed 14 trees. Fourteen trees were left unsprayed. A count of sound and sawfly-infested plums was taken on May 30, only plums that had set, being counted. The results are given in Table VI.

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Experiment 2.—This experiment was carried out on two rows of Czar trees in an orchard close to Experiment 1. The spraying was done with the same mixtures on the same dates and with similar spraying equipment. A count of sound and sawfly infested plums taken on May 30 gave the results recorded in Table VI.

TABLE VI

<i>Treatment</i>	<i>Dates of spraying</i>	<i>Total plums counted</i>	<i>Percentage damage by sawfly</i>
Control	—	{ Expt. (1) 800 Expt. (2) 900	40·8 27·8
Nicotine sulphate, 10 oz. Sulphonated loral, $\frac{1}{8}$ lb. Water, 40 gal. ..	May 3 & May 10	{ Expt. (1) 800 Expt. (2) 900	24·4 14·6
Derris, $\frac{1}{8}$ lb. ..			
Sulphonated loral, $\frac{1}{8}$ lb. Water, 40 gal. ..	May 3 & May 10	{ Expt. (1) 900 Expt. (2) 800	12·6 0·6

Experiment 3.—This experiment was carried out near Cambridge in a large orchard belonging to Messrs. Chivers and Sons, Ltd. The trees sprayed were very large Damson trees (about 40 years old) and 8-year-old Czar plum trees, planted in alternate rows. The Czars were in full bloom about April 19, and on May 7 when the cots were beginning to split, a few newly-hatched sawfly larvae were found. The following mixtures were used :—

- (1) Nicotine sulphate 10 oz.
Proprietary spreader 5 oz.
Water 40 gal.
- (2) Nicotine sulphate 10 oz.
Proprietary spreader 5 oz.
Lead arsenate powder 1 lb.
Water 40 gal.
- (3) Derris $\frac{1}{8}$ lb.
Proprietary spreader 5 oz.
Water 40 gal.

Blocks of trees in eight rows were sprayed on May 7 and May 16. Adjacent rows and a number of trees in the sprayed rows were left unsprayed. A power sprayer was used, giving a pressure of 250 lb. with four lances. On May 7, 15 Czar trees and 6 Damson trees were sprayed with 40 gal. of mixture (1), 6 Damsons and 14 Czars with 40 gal. of mixture (2), and 7 Damsons and 12 Czars with 40 gal. of mixture (3). On May 16, this spraying was repeated, but not all the

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trees were sprayed a second time, and some trees were sprayed for the first time on this date. On May 31, a count was taken of sound and sawfly-infested plums, and on August 1 the total number of plums per tree was counted, the results being recorded in Table VII.

TABLE VII (*Czar Plums*)

<i>Treatment</i>				<i>Dates of spraying</i>	<i>Total plums counted</i>	<i>Percentage damaged by sawfly</i>	<i>Av No. of plums per tree</i>
Control	..	..	..	—	800	71.5	12
							(av. of 14 trees)
Nicotine sulphate, 10 oz.	}			May 7	500	26.4	65
Proprietary spreader, 5 oz.				&			
Water, 40 gal.	}	..	..	May 16	500	44.0	39
Ditto				&			
Ditto	}	..	..	May 7	400	73.0	25
Ditto				&			
Nicotine sulphate, 10 oz.	}			May 7	900	10.0	254
Lead arsenate powder, 1 lb				&			
Proprietary spreader, 5 oz.	}	..	..	May 16	900	9.9	207
Water, 40 gal.				&			
Derris, 4-5 lb	}	..	..	May 7	900	9.9	207
Proprietary spreader, 5 oz.				&			
Water, 40 gal	}	..	..	May 16			
				&			

On May 31, a count of sound damsons and those infested with sawfly larvae was made, and on September 12 and 13 the fruit was picked and weighed; the average weight per tree is given in Table VIII.

TABLE VIII: (*Damsons*)

<i>Treatment</i>				<i>Dates of spraying</i>	<i>Total damsons counted</i>	<i>Percentage damaged by sawfly</i>	<i>Av weight of fruit per tree in lb.</i>
Control	..	..	..	—	1,000	85.1	39
							(av. of 15 trees)
Nicotine sulphate, 10 oz.	}			May 7	1,000	69.3	86
Proprietary spreader, 5 oz				&			
Water, 40 gal	}	..	..	May 16	1,000	33.3	103
Nicotine sulphate, 10 oz				&			
Lead arsenate powder, 1 lb.	}	..	..	May 7	600	33.7	109
Proprietary spreader, 5 oz				&			
Water, 40 gal.	}	..	..	May 16	1,000	48.3	66
Ditto				&			
Ditto	}	..	..	May 7	1,000	8.7	118
Derris, 4 lb.				&			
Proprietary spreader, 5 oz.	}	..	..	May 16	1,000	8.7	118
Water, 40 gal.				&			

Experiments and Observations on Dusting: (1)
Dusting as an Adult Deterrent.—Following the control of Apple Sawfly obtained by Miles* with a dust con-

* Dusting for the Control of Apple Sawfly: a preliminary experiment, by H. W. Miles. This JOURNAL, XXXIX, p. 1125, March, 1933.

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taining 30 per cent. of naphthalene, this deterrent was tested against Plum Sawfly in 1933. Dusting was carried out on Czar plum trees at two Cottenham centres. At the first centre, 40 to 50 per cent. of the blossoms were open, and a number of sawflies were present on April 7, when the first dusting was done. Thirteen trees were thoroughly dusted with a chest duster on April 7, and again on April 11 and April 14. A count, made on May 25 and May 26, of the number of plums damaged by sawfly larvae showed that the percentage of sawfly-infested fruits had been reduced from 71·5 per cent. on the undusted, to 29 per cent. on the dusted trees.

At the second centre, two blocks of Czar trees consisting of 10 and 9 trees respectively, were dusted on April 10 and April 13, and counts showed that the number of sawfly-infested plums was reduced from 30·3 per cent. on the undusted trees to 18·3 per cent. on the dusted trees.

(2) *Dusting to kill the Larvae.*—Plum Sawfly larvae migrate from one plum to another, and it was decided to try the effect of derris dust on the migrating larvae. Trees examined at night showed that very few more larvae came out from the plums at night than during the day, but more larvae were to be seen when the plums and leaves were wet after rain.

At two centres, in 1935, trees were dusted at night in order to obtain fairly still conditions. At Cottenham on the night of May 16-17, three rows of Czar plums were given a thorough dusting with a light derris dust (rotenone content 0·2 per cent.) and at a second centre 18 trees were similarly dusted. No larvae were seen migrating at the time of dusting. At the first centre, counts showed that the dusting reduced the infestation from 36·5 to 22 per cent., but at the second centre there was only a very slight reduction—from 15·5 to 12 per cent.

Large Damson trees in three orchards near Cambridge were also dusted at night with a derris dust. An examination on the following days showed that a few larvae were killed by the dust. One grower at Wilburton claims to have obtained a satisfactory control with this method.

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Summary.—In the above experiments two sprayings with derris gave rather better results than did spraying with nicotine sulphate plus lead arsenate.

Spraying at the time when the “ cots ” were beginning to split gave better results than spraying a week later.

Nicotine sulphate without lead arsenate gave only a moderate control.

Lead-arsenate (without nicotine sulphate) gave a poor control.

One dusting with a derris dust (0.2 per cent. rotenone) was not satisfactory.

Three dustings with 30 per cent. naphthalene reduced the infestation, but as this does not kill, it probably drives the sawflies to other trees.

Suggested Control Measures.—The following methods are recommended for the control of this pest :—

1. *In the case of a bad attack.*—Spray twice with :—

Derris	..	..	..	..	..	½ lb.
Spreader	..	..	..	..	..	5 oz.
Water	..	..	..	..	..	40 gal

First spraying should be done when the “ cots ” are beginning to split. If more than one day is required for spraying then a start can be made one or two days earlier and continued one or two days later. Second spraying a week later.

2. *In the case of a moderate attack.*—One spraying when the “ cots ” are beginning to split should give satisfactory results. The trees should be thoroughly washed with a driving spray as for Apple Sawfly.

Observations on Thrips Damage.—During the course of this investigation, it was noticed in some experiments that the plums on the plots sprayed with nicotine sulphate and lead arsenate were very clean as compared with those on the unsprayed plots. In some instances, the unsprayed trees were seen to be covered with Thrips which, by their feeding, raised small lumps and caused a roughening of the skin of young plums (Fig. 2); later, this roughening showed up as light blotches (Fig. 3). The species of Thrips responsible was identified, by Dr. Morison of Aberdeen, as *Taeniothrips inconsequens* Hzel.

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In Experiment 3, in 1933, a count was made, on June 19, of clean plums and plums marked by Thrips on trees sprayed with nicotine sulphate and lead arsenate, and on untreated trees. This treatment reduced the percentage of marked plums from 27·5 to 1·7 per cent.

Thrips were also responsible for injury to Damsons in the 1935 experiment, and a count made on September 12 showed that the Damsons marked by Thrips had been reduced from 43 per cent. on the unsprayed trees, to 29 per cent. on the trees sprayed with nicotine sulphate.

The authors are very much indebted to the growers for the facilities afforded by them in carrying out these experiments.

BRITISH OWLS

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THE Owls are an interesting and economically important group of birds. Five species now breed in Great Britain :—The Barn Owl, the Tawny Owl, the Long-eared Owl, the Short-eared Owl, and the Little Owl. Of these, four are indigenous to this country and the last named is an imported alien that has become firmly established in many parts. The Barn Owl has been omitted from this article, as it is the subject of an illustrated leaflet that has already been published by the Ministry.*

The Tawny Owl.—The Tawny or Wood Owl is, as its latter name implies, partial to wooded districts, and is quite common in suitable localities in this country. It is the largest of our native owls, and is the bird responsible for the “ hooting ” that is so often heard at night, and which, in the mind of the lay public, has been so long associated with owls generally.

Description.—Length, 14–16 in. There are two distinct forms of the Tawny Owl in this country, one having plumage of a largely brownish tone, and another whose prevailing colour is grey. In the former, which is by far the commoner, the upper parts are mottled with various shades of brown and grey, the brown predominating. The wings are spotted with white. The underparts are buffish white, mottled with brown and streaked with brown of a darker shade. The facial disc is grey, with a brown border. The eyes are black. The female is larger than the male. As with all owls, the talons are large and powerful, and are easily capable of killing a rat with a single grip.

Habits and Food.—The Tawny Owl is an early breeder, laying in March and sometimes even in February. Eggs may, however, be laid in summer or in autumn : there are, in fact, records of fresh eggs

* Advisory Leaflet No. 211 (The Barn Owl).

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being found in nearly every month of the year. A clutch of eggs may number from three to six. They are white and smooth-surfaced, and are nearly spherical. No nest is made, the eggs being deposited in hollow trees, barns, church towers, ruins, or on rocky ledges, and occasionally on the ground or in rabbit burrows. The most favoured site, however, appears to be a hollow tree.

The Tawny Owl hunts by night. It has a great aversion to sunlight and remains under cover during the daytime. When its retreat is discovered the bird is, like other owls, subject to mobbing by small birds, a difficulty with which, no doubt on account of its partial blindness in daylight, it seems quite unable to cope.

The food of the Tawny Owl consists of rats, mice and other rodents, moles, small birds, worms and insects. It has been known to take small fish from shallow water. Rodents undoubtedly make up the greater part of its diet, but it appears to take a larger percentage of small birds than does the Barn Owl. Probably the only misdemeanours with which it can be charged are occasional raids on poultry farms or game coverts. These, however, are exceptional.

The Little Owl.—Before the early part of the 19th century, this, the smallest of our owls, was known in this country only as an occasional straggler. In certain years, notably in 1843 and 1888, numbers of specimens were liberated by various people, with the result that the species established itself as a breeding bird and in many districts is now our commonest owl. Its successful colonization and present abundance can probably be attributed to the 1888 liberations.

Description.—Length about 8 in. The upper parts of the plumage are brown. The head and nape are striped and spotted with white. The wings also are spotted with white, and the tail is barred with white. The facial disc is grey. The underparts are greyish white, streaked with brown. The eyes are yellow.

Habits and Food.—The Little Owl lays from four to six white eggs in hollow trees, in barns and other buildings, ruins and cliffs, usually in April or May. Its food consists of rodents, small birds, worms, insects, frogs, etc. It hunts by day as well as at night.



The Lawney Owl

From a drawing by G. E. Lodge



From a drawing by G. E. Lodge

The Little Owl



The Long-eared Owl

From a painting by G. E. Lodge



The Short-eared Owl

From a drawing by G. T. Lodge.

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There has been much controversy as to the economic status of this bird. It undoubtedly does much useful work, but is also responsible for a great deal of harm. There is abundant evidence of its depredations amongst game and poultry, and many bird lovers object to it on account of its habit of destroying useful small birds or pleasing songsters, of which it kills many during the year. It is now too plentiful in many districts, and at the present time it would be difficult to make out a case for its protection.

The Long-eared Owl.—This owl, although not so common as the Tawny Owl, is fairly widely distributed throughout this country, and is definitely attached to woodlands, especially plantations of firs and other conifers.

Description.—Length 12–14 in. The plumage of the upper parts is buff-coloured, prettily mottled and streaked with brown and grey. The underparts are grey and buff, with broad longitudinal streaks and small transverse bars of black. The facial disc is buff with a blackish rim. The eggs are orange-yellow. The bird may be readily identified by its prominent “ear-tufts.”

Habits and Food.—The Long-eared Owl lays from four to six eggs, which are creamy white and smooth-surfaced, usually in the discarded nest of a magpie, crow, woodpigeon, or some other large bird. Quite frequently, however, an old squirrel’s drey is used. Like the Tawny Owl, the Long-eared Owl begins to breed very early in the year, fresh eggs having been found in February. The bird hunts by night and is seldom seen during the daytime. It feeds on rats, mice, voles, small birds, insects, etc. The bulk of its food, however, consists of rodents of various kinds, of which it kills a great number at all seasons of the year.

The Short-eared Owl.—This bird is much less common than the Long-eared Owl, and in the southern half of the country is chiefly an autumn and winter visitor, the numbers of these migrants varying considerably from year to year. It frequents open types of country, such as marshes, moors, commons and fens, but, notably when on migration, it is also often found

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on arable land, root fields and rough tussocky pastures being specially attractive to it.

Description.—Length 12–14 in. The plumage of this bird is very like that of the last-mentioned species, but is rather more heavily blotched. The underparts are streaked only, and not barred as in the Long-eared Owl. The “ear-tufts” are very short, and, except when the bird is excited or alarmed, are depressed and not noticeable. The eyes are pale yellow.

Habits and Food.—The Short-eared Owl lays its eggs on the ground, the “nest” being a mere scrape or depression in the earth. The eggs usually number about six, but clutches of as many as ten have been recorded. They are creamy white and smooth, and like those of owls generally are rather rounded in shape. As a rule they are laid in May, but have been found much later in the year.

The food of the Short-eared Owl consists of rats, field-mice and other rodents, birds, reptiles and insects. The bird hunts by day, and may sometimes be seen in open country, quartering the ground in search of its prey. The species does great service to agriculture when field-voles are exceptionally numerous, a plague of these rodents usually attracting all the Short-eared Owls in and near the district concerned. Many, indeed, come considerable distances to join in the good work. A notable example was furnished by the vole plague in south-west Scotland in 1890-1891, when the number of Short-eared Owls attracted to the infested area was estimated at several hundreds.

General Conclusions.—All the British Owls, with the exception of the Little Owl, are beneficial birds of the highest order. The Tawny Owl is, rarely, responsible for the destruction of young poultry and game birds, and the Long-eared and the Short-eared Owls, in an even lesser degree, also suffer occasional lapses, but their good work in the destruction of rodent and other pests far outweighs any harm they may do. These three species must, therefore, be regarded as good friends of the farmer and the agriculturist generally, and should be protected and encouraged in every possible way.

THE RELATIVE MERITS OF STEAMED AND RAW POTATOES IN THE FEEDING OF FATTENING PIGS

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A CONSIDERABLE amount of uncertainty prevails amongst pig feeders in south Lincolnshire as to the value of cooking potatoes for feeding to fattening pigs. Large quantities are fed in both the raw and cooked condition, and although it is a generally accepted fact that the pigs do better on cooked tubers, it is sometimes believed that the cost of cooking outweighs any advantage gained over raw feeding.

In certain circumstances much may be said for this argument, as when the cooking operation takes a man from his usual employment, thus adding seriously to the labour costs of the operation. In most instances, however, the "costings"* obtained on the Kirton Agricultural Institute Farm¹ are representative and show a figure that at its heaviest is by no means formidable.

It was felt desirable, however, to investigate the whole problem. The results of certain similar trials were available. Edwardes-Ker and Hannaford² in a somewhat similar investigation found that the raw tubers proved an unsatisfactory foodstuff. Wilson and Kuhlman³ also obtained poor results from their use, and experienced difficulty in getting the pigs to consume them. In both experiments satisfactory results were obtained from cooked potatoes. On the other hand, Bryner Jones⁴ did not find a great deal of difference in the feeding values, and, although the cooked tubers gave slightly better live-weight gains, these were almost counterbalanced by the increased labour costs.

On February 8, 1934, fourteen pigs were selected from two litters out of Large Black Sows by a Large

* The actual figure found was 3s. 10½⁷ per ton, unless much unusual preparation of the potatoes was required.

¹ For references, see p. 1127.

STEAMED OR RAW POTATOES FOR FATTENING PIGS

White Boar. The pigs were farrowed on Oct. 21 and Oct. 23, 1933, and were thus between 15 and 16 weeks old at the start of the trial. Two pens of seven pigs each were made up, and selected so that the total weight, the sex, the litter origin and general appearance per pen were as near as possible alike.

The feeding was based on the rations then in use in commercial feeding on the farm, the initial mixture being that on which the pigs were being fed before the experiment, with the exception that raw potatoes were used instead of steamed potatoes in the case of Pen A. As the experiment proceeded, the mixtures were adjusted to requirements, and the proportion of potatoes gradually increased.

The actual mixtures used were as follows:—

	<i>Feb. 8-19</i>	<i>Feb. 20- Mar. 11</i>	<i>Mar. 12- Apr. 3</i>	<i>Apr. 4-19</i>	<i>Apr. 20- July 4</i>
	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>
Fish meal ..	10	5	5	—	—
Extracted soya meal ..	21	16	27	30	38
Sharps ..	40	20	20	10	10
Maize meal ..	45	35	35	18	—
Barley meal ..	—	35	35	60	78
Potatoes ..	100	100	200	200	300
Carbonate of lime ..	—	—	—	3	3
Salt ..	—	—	—	1	1

The costs of the separate combinations used were as follows:—

Feb. 8-19	£4 4 8 per ton
Feb. 24-Mar. 11	£3 18 4 „ „
Mar. 12-April 3	£3 1 10 „ „
April 4-19	£2 18 1 „ „
April 20-July 4	£2 10 1 „ „

Balanced meal mixtures upon which these feeding mixtures were based—in actual practice potatoes replacing some of the carbohydrate meals—would have cost as follows:—

Period Feb. 8-19	£7 1 9 per ton
Feb. 20-April 3	£6 11 9 „ „
April 4-July 4	£6 3 8 „ „

These costs are based on actual payments for mixture ingredients delivered to the farm but not mixed. The charge for potatoes is actual cost delivered to the farm, plus the cost of steaming, a total of 16s. 6d. per ton.

The raw potatoes were sliced for Pen A; such a procedure is unusual in actual feeding practice in south

STEAMED OR RAW POTATOES FOR FATTENING PIGS

Lincolnshire. It was felt, however, that this would be helpful to the pigs as they had been accustomed to cooked potatoes. For the same reason, except for the introduction of raw potatoes, the mixture in use before the trial (the commercial weaners' mixture) was continued for some time, although the pigs were due for change to the first stage fattening mixture. Also, the proportion of potatoes was not advanced so rapidly as it would have been in commercial practice. The final mixture represented the actual commercial fattening mixture then in use on the farm. The proportion of potatoes was rather lighter than usual on account of shortage of supplies.

Pen A took a little time to become accustomed to the raw potatoes, but after a short time ate their rations readily. Until the pigs had become accustomed to the raw potatoes these were fed separately and consumed before the meal ration was supplied. Throughout the trial the pigs were fed to the limit of their capacity. No additional food allowances, such as green food or cod liver oil, were given.

The pigs in Pen B on steamed potatoes took the lead at once, and kept and increased it as the trial proceeded. The pigs in Pen A, however, though always definitely behind those in Pen B, maintained a good appearance and indeed were always judged as likely to be the better "graders." The health of all the pigs was good throughout.

The pigs were disposed of to the bacon factory as they became ready, and the trial was concluded with the dispatch of the last pigs on July 4. The first pigs were sold on May 23. The dates of sale were as follows:—

		<i>Average weight</i>		<i>Average weight</i>	
		<i>lb.</i>		<i>lb.</i>	
May 23	.. Pen A.	—		Pen B. 5 pigs.	224
.. 30	 A. 3 pigs.	205		.. B. 1 pig.	204
June 20	 A. 2 pigs.	219½		.. B. 1 pig.	239
July 4..	 A. 2 pigs	208		—	
		7 pigs.		7 pigs.	

One pig from Pen A just failed to reach bacon weight, viz. 140 lb. dead, and was not graded. The six pigs from Pen A graded very slightly better than the seven pigs of Pen B, but the difference was not large enough to be seriously considered, amounting only to 0.24 of a grade.

STEAMED OR RAW POTATOES FOR FATTENING PIGS

The essential figures of the results are as follows :—

	<i>Pen A.</i>	<i>Pen B.</i>
Initial Live Weight per pig. . .	69·4 lb.	70·28 lb.
Average L.W. at close per pig . .	210·21 „	223·50 „
L.W. increase per pig	140·81 „	152·22 „
L.W. increase per pig per day . .	1·101 „	1·406 „
Average period of feeding	127·85 days	109 days
Average age at close.	236·85 „	218 „
Meal equivalent consumption per pig	556·3 lb.	452·71 lb.
Meal equivalent consumption per pig		
per day	4·351 „	4·153 „
Meal equivalent consumption per lb.		
L.W. increase	3·95 „	2·950 „
*Gross cost of food per pig	24s. 2d.†	24s. ½d.‡
Gross cost of food per lb. L.W.		
increase	2·059d.	1·88d.
Cost of food per score D.W. . . .	4s. 3d.	3s. 1d.
Estimated total labour cost per pig		
during fattening period at 4d. per		
week (5)	6s. 1d.	5s. 2d.

* No allowance for tenant right on foodstuffs.

† No charge made for slicing the potatoes, since this is not the usual practice in feeding raw potatoes.

‡ Includes cost of preparation of potatoes at rate of 4s. per ton.

These figures in the main call for little comment, but one or two points included in the results need some attention. The difference in cost of food on the production of each unit of live-weight increase is narrow, and in this instance would suggest that the position of pig feeders who claim the greater economy of raw potatoes is on a sounder basis than might be expected. While this may appear so in this instance, it must be remembered that the cost of meal during the period covered by the trial was very low, and that any rise in price of meal would reflect itself in favour of the cooked potatoes group, and so widen the margin. It is also pertinent to wonder what may have been the exact effect of slicing the tubers fed to the raw group in contrast to the usual practice of feeding whole. In any case the cost margin is definitely in favour of cooking the tubers.

The feeding period in each case was lengthy, both by general standards and by comparison with results in the commercial herd. The slow feeding is not easily accounted for; it is to be observed that the bulk of the pigs (five) in Pen B were ready after 104 days feeding, that is at about seven months, while the final pig of the pen was ready some time before it was dispatched, awaiting the completion of a consignment. Even so,

STEAMED OR RAW POTATOES FOR FATTENING PIGS

the feeding period was more lengthy than was anticipated. The daily food consumption was rather low, and it may be that the explanation lies in this direction.

General Conclusions.—Confirmation is given to the accepted view that cooked potatoes provide a more satisfactory foodstuff for the pig than the raw tubers. In this trial it has worked out that 1 lb. of the ration containing steamed potatoes and 1.34 lb. of the ration containing raw potatoes are of equivalent value.

On the cost factor the superior feeding value of the cooked tuber has resulted in a lower cost of production per unit of live-weight increase, from two stand-points :—

- (a) Actual cost of food.
- (b) Labour cost involved.

In this trial raw potatoes were found to be a moderately successful foodstuff, which under certain economic conditions would be of definite feeding value.

BIBLIOGRAPHY.

1. Wallace and Thompson : " Use of Potatoes in Pig Feeding," This *Journal*, 1930, 37.
2. D. R. Edwardes-Ker and J. Hannaford : " Feeding Potatoes to Pigs." Scale Hayne Agricultural College, Pamphlet 9.
3. J. W. Wilson and A. H. Kuhlman . " Potatoes as a Feed for Fattening Pigs." Agric. Exper. Sta., South Dakota, Bulletin 209.
4. Bryner Jones : " The Feeding of Pigs with Cooked and Uncooked Potatoes " University College of Wales, Aberystwyth, Agric. Dept., Bulletin 1.
5. Harper Adams College Pig Feeding Experimental Station, Pig Feeding Report, No. 1.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1935*

PRODUCE OF CROPS

THE yield of most corn and root crops was lower in 1935 than in the previous year, but weather conditions were more favourable for both seeds hay and permanent grass which gave larger yields per acre than in either of the two preceding years. The estimated total production of oats in England and Wales during 1935 was greater than in 1934, but lower figures were recorded for all the other corn and root crops. The estimated production of oats during 1935 was greater by 2·0 per cent. than last year, while for wheat, barley, potatoes, turnips and swedes and mangolds the decreases were 7·2, 9·8, 15·1, 1·4 and 3·5 per cent. respectively. Seeds hay and meadow hay both show appreciable increases in production over the previous year.

The estimated yields of the corn crops are higher than the average yields for the past 10 years, but, of the root and hay crops, meadow hay alone shows a yield higher than the 10 years' average.

Owing to changes made in the items relating to peas and beans in the Agricultural Schedule for 1935 the acreages of these crops picked ripe were not ascertained and it is no longer possible to estimate the total production of beans and peas harvested as corn.

Corn Crops: *Wheat*.—The area under wheat in England and Wales in 1935 was 1,772,284 acres and was 0·7 per cent. more than in 1934, while the estimated yield per acre over the whole country was 18·3 cwt. compared with 19·9 cwt. in the previous year. The result is that the total production of wheat for 1935 is estimated to be 1,623,000 tons or 125,000 tons less than last year, a decrease of 7·2 per cent. In the principal wheat growing areas the yields were generally higher than the average yields for the previous ten years but in some areas, where wheat is not grown so

* This return was published on December 18, 1935.

AGRICULTURAL RETURNS, 1935: PRODUCE OF CROPS

PRELIMINARY STATEMENT SHOWING THE ESTIMATED TOTAL PRODUCE AND YIELD PER ACRE OF THE CORN, HAY AND ROOT CROPS IN ENGLAND AND WALES IN 1935, WITH COMPARISONS FOR 1934, AND THE AVERAGE YIELD PER ACRE OF THE TEN YEARS 1925-1934.

Crops	Estimated Total Produce		Acreage		Estimated Yield per Acre		Average of the ten years, 1925-34
	1935	1934	1935	1934	1935	1934	
	Thou- sands of Tons	Thou- sands of Tons	Acres	Acres	Cwt.	Cwt.	Cwt.
Wheat ..	1,623	1,748	1,772,284	1,759,410	18·3	19·9	17·7
Barley ..	656	727	791,645	860,594	16·6	16·9	16·2
Oats ..	1,138	1,116	1,418,356	1,401,712	16·1	15·9	15·7
Mixed Corn ..	71	77	93,320	96,399	15·3	16·0	15·7
Seeds Hay* ..	1,795	1,553	1,385,591	1,288,788	25·9	24·1	27·3
Meadow Hay†	4,838	4,152	4,642,704	4,822,651	20·8	17·2	19·7
Potatoes	2,919	3,439	462,796	487,558	6·3	7·1	6·4
Turnips and Swedes	4,590	4,656	493,255	518,785	9·3	9·0	11·9
Mangolds	4,566	4,753	249,866	245,943	18·3	19·2	18·8

* Hay from Clover, Sainfoin and Grasses under rotation.

† Hay from Permanent Grass.

extensively, the yields were considerably below average. This was particularly noticeable in Dorset where the ten years' average yield is 2·9 cwt. per acre greater than this year's crop, and in Cornwall and the Isle of Wight where the 1935 yield has fallen below the average of the years 1925-1934 by 2·1 cwt. per acre. In the North-Eastern Division the yield per acre for this year is greater by 1·7 cwt. than the average yield and in Lincoln (parts of Holland) an increase over the past ten years' average of 4·8 cwt. per acre has been obtained. In the Isle of Ely also, the yield in 1935 has proved to be larger by 3·9 cwt. per acre than the average yield of the years 1925-1934.

Barley.—The area devoted in 1935 to the growing of barley was 68,949 acres less than in 1934, a decrease of

AGRICULTURAL RETURNS, 1935: PRODUCE OF CROPS

8·0 per cent., and as there was also a decrease of 0·3 per cent. in the average yield per acre, the total production fell by 71,000 tons from 727,000 tons in 1934 to 656,000 tons in 1935, a loss of 9·8 per cent. The estimated average yield of 16·6 cwt. per acre for the whole country is 0·4 cwt. per acre above the ten years' average. In England the majority of the counties show larger yields than the previous ten years' averages, and in the counties in which barley is grown to the largest extent, namely, Norfolk, East Suffolk, Lincoln (parts of Lindsey) and Essex, increases varying from 1·6 cwt. per acre in Lindsey to 0·1 cwt. per acre in Essex have been recorded.

Oats.—The estimated average yield of oats per acre for this year shows an improvement on the 1934 yield and as there was also an increase of 16,644 acres or approximately 1·2 per cent. in the area under the crop, the total estimated production of oats in 1935 was larger by 22,000 tons than in 1934, the increase being equivalent to 2·0 per cent. The yield per acre this year was 0·4 cwt. per acre more than the yield for the average of the preceding ten years, most counties showing an improvement. The greatest increase in the yield per acre has been experienced in the Holland division of Lincoln. All the divisions in both England and Wales with the exception of the South-Western Division show improvements in yield. The decrease in the South-Western Division amounts to 0·4 cwt. per acre.

Mixed Corn.—Since there were 3,079 acres less under mixed corn in 1935 than in the previous year, a decline of 3·2 per cent., and as the estimated average yield of 15·3 cwt. per acre was 0·7 cwt. below that of 1934, the total production fell to 71,000 tons, a decline of 7·8 per cent. The yield per acre for 1935 also is less than for the ten years 1925–1934, the decrease amounting to 0·4 cwt. per acre. In Cornwall, where the acreage devoted to the cultivation of mixed corn is very much larger than in any other county, the average yield per acre has fallen by 1·5 cwt. and this decrease has largely counterbalanced the increases which have been recorded in many other counties where mixed corn is grown to a smaller extent.

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Hay.—Exceptionally good weather was experienced during the haymaking season and the hay crop was secured in excellent condition; the quality of the crop was good and the yield of average weight.

Seeds Hay.—The yield of seeds hay was 1·4 cwt. per acre below the ten years' average but was 1·8 cwt. per acre greater than the yield for 1934. The area devoted to the crop in 1935 was larger than in the previous year by 96,803 acres or 7·5 per cent., and the total production for the current year is estimated at 1,795,000 tons or 242,000 tons greater than in 1934, an increase of 15·6 per cent. Most counties show for 1935 yields which are less than the average yield for the ten years 1925–1934, and the North-Eastern Division, where the average yield is 5·1 cwt. per acre below the ten years' average, is responsible for the most marked decline

Meadow Hay.—The yield of meadow hay was 3·6 cwt. per acre greater than that of 1934 and 1·1 cwt. per acre above the average yield for the previous ten years, but the acreage devoted this year to meadow hay fell by 179,947 acres below the area in 1934 and the total production therefore showed an increase over 1934 of only 686,000 tons or 16·5 per cent. The total production for this year is 4,838,000 tons compared with 4,152,000 tons in 1934. Larger yields than the average were general over the whole country except in the North-Eastern Division and were most apparent in the counties of Dorset, Somerset and Buckingham. In Dorset the yield per acre for this year was 7·0 cwt. greater than the past ten years' average yield.

Potatoes.—The area under potatoes, which declined last year, showed a further decrease in 1935, the area devoted to the crop falling by 24,762 acres from 487,558 acres in 1934 to 462,796 acres in 1935, a decrease of 5·1 per cent. The yield during 1935, was also smaller by 0·8 tons per acre than in the previous year and 0·1 tons per acre less than the average for the previous ten years. The lower yield, combined with the decreased acreage has been responsible for a loss in total production as compared with last year of 520,000 tons, the production for 1934 being 3,439,000 tons as against an estimated production of 2,919,000

AGRICULTURAL RETURNS, 1935: PRODUCE OF CROPS

tons in 1935 or a decrease of 15·1 per cent. The average total production of potatoes for the ten years 1925–1934 was 3,156,000 tons per annum. It will, therefore, be observed that the estimated production for 1935 is 237,000 tons less than the previous ten years' average, a decrease of approximately 7·5 per cent. Only in the North-Eastern and Eastern Divisions have the ten years (1925–1934) average yields been exceeded in 1935, and even in these cases the increases were slight.

The Ministry's estimate of total production includes seeds and chats in addition to ware potatoes, and also covers first and second earlies as well as the main crop.

Roots: *Turnips and Swedes.*—The area on which turnips and swedes were grown was less this year than in 1934 by 25,530 acres, a decrease of 4·9 per cent., and the total production for 1935 is estimated to be 66,000 tons less than last year, a decline of 1·4 per cent. It is estimated that the yield per acre will be 0·3 tons greater than the yield in 1934 but 2·6 tons below the average yield for the ten years 1925–1934. In practically every county in England and Wales the average yield per acre is less than the average yield during the previous ten years, and, among the counties in which the crop is grown most extensively, the loss is most pronounced in Norfolk, where the decrease amounts to approximately 5·9 tons per acre. It is only in Northumberland and Cumberland in England and in Cardigan and Montgomery in Wales that the average yield per acre in 1935 has exceeded the average yield of the previous ten years.

Mangolds.—The area under mangolds this year was 249,866 acres and was greater than the corresponding area in 1934 by 3,923 acres or 1·6 per cent. The estimated yield of the crop is, however, 0·9 tons per acre less than last year and, consequently, the total production of the crop shows a decrease of 167,000 tons or 3·5 per cent., having dropped from 4,733,000 tons in 1934 to 4,566,000 tons in 1935. The estimated yield per acre for the crop is 0·5 tons below the average yield for the previous ten years. Yields per acre this year have varied considerably, some counties showing considerable increases over the average yields for the past ten years, while others show just as large decreases.

AGRICULTURAL RETURNS, 1935 : PRODUCE OF CROPS

In Cumberland an increase of 5·1 tons per acre was obtained, whereas in the Isle of Ely the average yield was 6·9 tons per acre below that of the ten years 1925–1934.

Sugar-Beet.—The area under sugar-beet was 366,700 acres or 29,648 acres less than in 1934. The yield of washed and topped beet is estimated at 8·4 tons per acre, or 0·5 tons per acre less than that for 1934, and it is anticipated that the total production of washed and topped beet will be approximately 3,100,000 tons.

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Milk Marketing Scheme: Pool Prices for December, 1935 :—Pool prices and rates of producer-retailers' contributions for December, 1935, are given below, with comparative figures for November, 1935, and December, 1934. In each month the wholesale liquid milk price was 1s. 5d. per gal.

	Pool Prices (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	Dec. 1935	Nov. 1935	Dec. 1934	Dec. 1935	Nov. 1935	Nov 1934
Northern ..	13½	13½	14½	3½	3½ ⁵ / ₁₆	2½ ⁷ / ₁₆
North-Western ..	13½	13½	14½	3½ ¹ / ₁₆	3½ ⁵ / ₁₆	2½ ⁷ / ₁₆
Eastern ..	14	13½	14½	2½ ¹ / ₁₆	2½ ⁵ / ₁₆	2½
East Midland ..	13½	13½	14½	2½ ⁷ / ₁₆	3½ ¹ / ₁₆	2½
West Midland ..	13½	13	14	3½	3½	2½ ⁵ / ₁₆
North Wales ..	13½	13	14	3½	3½ ¹ / ₁₆	2½ ⁵ / ₁₆
South Wales ..	13½	13½	14½	3½ ¹ / ₁₆	3½ ¹ / ₁₆	2½
Southern ..	14	13½	14½	2½ ¹ / ₁₆	2½ ⁵ / ₁₆	2½ ¹ / ₁₆
Mid-Western ..	13½	13	14½	3½	3½	2½ ⁷ / ₁₆
Far-Western ..	13	13	14	3½ ¹ / ₁₆	3½	2½ ⁵ / ₁₆
South-Western ..	14½	14	14½	2½	2½	2½ ¹ / ₁₆
Unweighted Average	13.55	13.36	14.34	3.03	3.23	2.37

These prices do not include any premiums for special services or level deliveries for which the producer may qualify, nor the premium of 1d. per gal. paid to accredited producers.

The inter-regional compensation levy was fixed at 1½d. per gal. on liquid milk sales compared with 1½d. per gal. in November, 1935, and December, 1934, respectively. A levy of ¼d. per gal. was made for general expenses.

Sales on wholesale contracts were as follows :—

					Dec., 1935 (estimated) Gal.	Dec., 1934 Gal.
Liquid ..	..	..	..	..	45,696,511	45,158,478
Manufacturing ..	..	..	..	..	20,063,149	17,753,148
					65,759,660	62,911,626
Percentage Liquid Sales ..					69.45	71.78
,, Manufacturing Sales ..					30.55	28.22

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The average realization price of milk used in the manufacture of milk products for December was 6·02*d.* per gal., compared with 6·34*d.* per gal. for December, 1934. Milk manufactured into cheese by farmhouse cheesemakers amounted to 379,217 gal., compared with 516,502 gal. in November, and 252,209 gal. in December, 1934.

Committee of Investigation for England.—The Committee of Investigation for England held meetings throughout January at which evidence was given on behalf of the Central Milk Distributive Committee and the Parliamentary Committee of the Co-operative Congress in support of their complaints against the operation of the Milk Marketing Scheme. The Board's reply to the complaints was opened on January .

Potato Marketing Scheme: Sale of "Seconds."—The Potato Marketing Board have resolved to permit the sale under licence of "seconds" for human consumption. "Seconds" are defined as sound, marketable potatoes which have passed through a riddle of 1 $\frac{5}{8}$ in. and stand on a riddle of 1 $\frac{1}{4}$ in. Special labels to be attached to the containers will be issued free by the Board, and applicants for licences are required to give a written assurance that they have a buyer or buyers for the tonnage represented by the number of labels for which they apply.

Pigs and Bacon Marketing Schemes: Pig Prices for January.—Under the terms of the 1936 contract, the prices of bacon pigs are again based on the ascertained price of British bacon and the price of a standard ration of feeding stuffs, though the formula is slightly different from that used in 1935; the realization value of offals is also taken into account.

The basic pig price (Class I, Grade C) for January, calculated on the new formula, was 9*s.* 11*d.* per score compared with 10*s.* 2*d.* per score for December. There was only a slight variation in the cost of the feeding stuffs ration in January as compared with the previous month, but there was a fall in the ascertained bacon price from 82*s.* 5*d.* to 76*s.* 11*d.* per cwt.

As under the contract for 1935, the curer still makes an additional contribution of 2*d.* per score towards a

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level delivery bonus on pigs delivered during the first four months of the year.

Bacon-pig Contracts for 1936.—The Pigs Marketing Board fixed January 15 as the closing date for the receipt of the supplementary contracts offered by them in December.

As the number of pigs on contract for the month of January was insufficient to meet curers' requirements, curers who were short of pigs were permitted to buy sufficient pigs in the open market to bring their total throughput up to 72 per cent. of their stated requirements.

Bacon Development Board: Retailers' Committee.—The Bacon Development Scheme provides that the Board shall appoint a Retailers' Committee to advise them on matters affecting retailers of bacon and the retail trade in bacon generally. The Board have now appointed the Committee, on which the following organizations are represented :—

The National Federation of Grocers' and Provision Dealers' Associations.

The Parliamentary Committee of the Co-operative Congress.

The Scottish Federation of Grocers' and Provision Merchants' Associations.

The United Kingdom Association of Multiple Shop Proprietors.

The National Federation of Meat Traders' Associations.

Bacon Development Scheme : Licensing of Bacon Factories.—The Bacon Development Board has announced that, at a meeting held on January 13, final decisions were taken on 26 applications for licences for new bacon factories.

The Board state that the main consideration before them was that the existing curing capacity in this country is already far in excess of available supplies of pigs. It is generally recognized that one of the main obstacles to economic production in the bacon industry is the heavy overhead cost that results from a low turnover. The Lane-Fox Reorganization Commission, on whose Report the Development Scheme is based, found, in 1932, that English bacon factories were operating at little more than half their capacity, and it was largely for this reason that they recommended that the sanction of the Development Board should be required for all new construction or extensions of factories. The pig supply position has certainly improved somewhat

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since their report was issued, but the problem has by no means disappeared, as the factory capacity has also increased, not only as a result of extensions of factories, but also through the change-over of many firms from dry-curing to tank-curing.

The Board, accordingly, decided to refuse licences in 18 out of the 26 cases. In addition, 4 applications for permission to extend existing premises were refused. Licences were granted in a number of cases where curers desired to transfer their licences to new and improved premises, provided that the new premises represented no increase in production capacity. The Board also decided, in view of particular circumstances, to grant 2 licences for new factories, subject to the applicants agreeing to specified conditions.

Bacon Supplies in 1935.—The following table shows the supplies of bacon (including salted pork and tinned hams) that were available from all sources for consumption in the United Kingdom each month in 1935 :—

Month	Great Britain Output			Northern Ireland Output	Net Imports†	Total
	From home pigs	From imported pigs and carcasses*	Total			
	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
January ..	132,619	23,225	155,844	44,629	678,049	878,522
February ..	109,928	22,814	132,742	35,529	586,706	754,977
March ..	133,819	28,450	162,269	31,219	613,758	807,246
April ..	154,046	26,935	180,981	39,615	660,546	881,142
May ..	160,035	30,597	190,632	48,069	670,789	909,490
June ..	147,305	27,460	174,765	48,618	633,782	857,165
July ..	165,877	30,530	196,407	41,911	694,314	932,632
August ..	183,104	34,881	217,985	51,717	671,503	941,205
September ..	201,439	35,040	236,479	59,179	616,834	912,492
October ..	230,879	36,873	267,752	73,529	557,813	899,094
November ..	237,288	23,357	260,645	58,894	584,118	903,657
December† ..	158,604	25,806	184,410	50,598	635,791	870,799
Total ..	2,014,943	345,968	2,360,911	583,507	7,604,003	10,548,421

* Including Northern Ireland pigs shipped to Great Britain.

† Imports minus re-exports.

‡ Provisional.

Total supplies amounted to 10,548,421 cwt. compared with the figure of 10,670,000 cwt. recom-

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mended by the Lane-Fox Commission as the quantity at which the total annual bacon supplies in the United Kingdom should be stabilized. To the latter figure must be added a small allowance in respect of tinned hams and salted pork.

Bacon Import Arrangements for 1936.—In the January, 1936, issue of this JOURNAL (page 1026) it was stated that it had been decided to continue the foreign quota for the first six weeks of 1936 at the rate that was in operation during the last quarter of 1935.

The allocations to the individual foreign exporting countries for the period of six weeks are as follows :—

<i>Country</i>	<i>Allocations</i>	
	<i>1 Jan. to</i>	<i>11 Feb. 1936 (a)</i>
	<i>cwt.</i>	
Denmark	388,355	(b)
Netherlands	55,009	
Poland	40,034	
Sweden	27,215	
Lithuania	17,082	
Estonia	4,606	
Finland	2,456	
Latvia	4,299	
U.S.S.R.	5,220	
Argentina	4,299	
U.S.A.	46,323	
Allowance for imports from foreign countries not scheduled to the Bacon (Import Regulation) Order	14,566	(c)
Total	615,464	

- (a) Subject to amendment, in the case of certain countries, in respect of overshipments or undershipments in previous periods.
- (b) Of this allocation, a quantity of 20,663 cwt. is on account of adjustments due in respect of deficiencies in imports from Denmark in 1935, below the minimum of 62 per cent. of permitted foreign imports guaranteed to that country under the Anglo-Danish Trade Agreement.
- (c) In accordance with the Bacon (Import Regulation) Amendment Order, 1935. (See below.)

*The Bacon (Import Regulation) Amendment Order, 1935.**—The Bacon (Import Regulation) Order, 1934, provided that imports of bacon into the United Kingdom from any foreign country not scheduled in the Order (the countries included in the schedule being the eleven main

* S.R. & O., 1935, No. 1237.

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foreign sources of imported bacon) need not be licensed as long as they did not exceed a rate of 400 cwt. per week. This provision has now been amended by the Bacon (Import Regulation) Amendment Order, which was signed by the President of the Board of Trade on December 18, 1935, and came into force on January 1, 1936. This Amendment Order reduces to (a) 225 cwt. per week, or (b) nine-sixteenths of the imports during 1934 or 1935 (whichever is the greater) the previous maximum of 400 cwt. per week for unlicensed imports from any unscheduled foreign country. The rule (b) applies where imports from a country were at a rate less than 400 cwt. per week in 1934 or 1935.

The new Order will reduce the quantity of bacon imported from foreign countries not scheduled to the main Order, and it is hoped that such imports will in future be prevented from reaching a volume which in the past has made it difficult to assure to Denmark the minimum of 62 per cent. of permitted foreign imports guaranteed to her under the Anglo-Danish Trade Agreement.

Cattle (Import Regulation) Order, 1933.—The following table shows imports into the United Kingdom from the Irish Free State of cattle of the three classes regulated under this Order in each month of 1935 as compared with imports in the corresponding months of 1934 :—

Month	Fat Cattle		Store Cattle		Bulls and Dry Cows for slaughter	
	1934	1935	1934	1935	1934	1935
January	7,232	5,682	29,310	23,531	1,361	1,359
February	5,845	5,036	26,837	24,088	1,127	1,313
March	7,084	8,890	30,815	51,610	1,482	1,667
April	4,220	7,250	27,239	42,384	878	1,299
May	4,296	6,398	25,848	35,034	617	1,009
June	3,475	6,857	18,775	24,760	615	1,032
July	5,241	8,480	8,710	32,242	791	801
August	13,272	8,117	8,551	15,433	917	880
September	13,048	17,074	16,692	36,534	914	1,154
October	16,099	19,356	47,005	63,999	1,511	1,296
November	16,085	18,606	48,177	53,405	1,594	1,559
December	12,039	17,640	26,320	30,741	1,785	1,954
Total	107,936	130,286	314,279	433,761	13,592	15,323

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The arrangement made with the Government of the Irish Free State in December, 1934, with respect to exports of coal from the United Kingdom to the Irish Free State and imports of cattle from the Irish Free State to the United Kingdom, provided for the importation into the United Kingdom in 1935 of a maximum of $66\frac{2}{3}$ per cent. of the numbers of fat cattle and $133\frac{1}{3}$ per cent. of the numbers of store cattle and of dry cows and bulls for slaughter, imported in 1933. This represented an increase of $33\frac{1}{3}$ per cent. on the basic allocations for the three classes of cattle in 1934, the total of which was 433,208. The total of the maximum allocations for 1935 was 590,956: actual imports were 579,370, as shown above.

Milk Act, 1934.—Payments made from public funds up to January 15, are as follows:—

(a) Advances in respect of manufacturing milk.

Section	In respect of milk	Period of manufacture	Gallons	Amount £
1	(1) <i>Milk Marketing Board for England and Wales.</i> Manufactured at factories other than the Board's	April, 1934– October, 1935	287,476,218	1,544,854
2	Manufactured by Board	April, 1934– July, 1934	187,331	1,105
3	Made into cheese on farms	April, 1934– June, 1935	20,653,552	120,236
	Total England and Wales ..		308,317,101	1,666,195
6	(2) <i>Government of Northern Ireland.</i> Manufactured into cream and butter at registered creameries	April, 1934– October, 1935	36,728,857	274,795

(b) Contributions towards the expenses of the Milk Marketing Board for England and Wales in carrying out approved arrangements for increasing the demand for milk.

Section	Nature of Service	Period covered	Gallons	Amount £
II	Supply of Cheap Milk to school-children	October, 1934– October, 1935	24,788,867	447,496
	Initial Publicity for above	—	—	2,000
			Total ..	449,496

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Cheese-Milk Price.—For the purpose of Exchequer advances under the first three Sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister and the Secretary of State for Scotland to be 4·46 pence per lb. for the month of January, 1936.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by January 18 to £5,029,209. These payments were in respect of 2,114,120 animals, the average payment per beast being £2 7s. 7d. Some 637,243 imported animals have been marked at ports (excluding Northern Ireland) since August 6, 1934, under the Marking of Imported Cattle Orders, 1934 and 1935.

Wheat Act, 1932: Sales of Home-grown Wheat—Cereal Year 1935-36.—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1935, to January 10, 1936 cover sales of 18,670,295 cwt. of millable wheat as compared with 18,839,005 cwt. in the corresponding period (to January 11, 1935) in the last cereal year.

Flour Millers' Corporation.—Under the provisions of the Second Schedule to the Wheat Act, a draft scheme has been submitted to the Minister of Agriculture and Fisheries and the Secretaries of State for Scotland and the Home Department providing for the election of the members of the Flour Millers' Corporation by registered millers, and making provision for the number of such members and as to the functions of the Corporation.

In accordance with paragraph 6 of the Second Schedule referred to above, the Minister has directed the Preliminary Corporation to give public notice of the submission of the draft scheme. Copies of the draft scheme may be obtained from the Preliminary Flour Millers' Corporation, 40, Trinity Square, London, E.C.3 (price 3d. post free), or may be inspected at that address between 10 a.m. and 4 p.m. on weekdays and 10 a.m. and 12 noon on Saturdays (except on public holidays).

Any objections and representations with respect to

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the draft scheme should be made to the Departments concerned by February 8, 1936.

Sugar-beet: Production of Home-grown Beet Sugar during 1935-36 Campaign.—According to returns made to the Ministry by the beet sugar factories operating in Great Britain, the total quantities of beet sugar manufactured during December, 1935, and the corresponding month in 1934 were :—

				<i>White cwt.</i>	<i>Raw cwt.</i>	<i>Total cwt.</i>
1935	..	..	..	1,202,047	1,557,671	2,759,718
1934	..	..	..	1,175,834	1,795,830	2,971,664

The total quantities of sugar produced to the end of December in each of the two manufacturing campaigns were :—

				<i>White cwt.</i>	<i>Raw cwt.</i>	<i>Total cwt.</i>
Campaign, 1935-36	..			3,987,995	4,889,822	8,877,817
„ 1934-35	..			4,214,750	5,612,780	9,827,530

National Mark Beef.—The number of sides (including quarters and pieces expressed in terms of sides) of beef graded and marked with the National Mark during October, November and December, 1934 and 1935, and the three weeks ended January 18, 1936, were as follows :—

LONDON AREA						
				<i>Home-killed</i>	<i>Scotch sides for London</i>	<i>Total</i>
October, 1934	..	..		9,654	6,648	16,302
„ 1935	..	..		14,010	7,624	21,634
November 1934	..			9,066	6,239	15,305
„ 1935	..			13,745	7,796	21,541
December, 1934	..			10,956	7,307	18,263
„ 1935	..			15,479	9,617	25,096
Three weeks ended January 18, 1936	..			8,342	6,173	14,515

BIRKENHEAD AREA (Including Liverpool)						
				<i>For London (Included under home-killed in London Area)</i>	<i>Liverpool (For local requirements)</i>	<i>Total</i>
October, 1934	..	..		3,115	1,508	4,623
„ 1935	..	..		4,020	1,815	5,835
November, 1934	..			2,950	1,546	4,496
„ 1935	..			4,741	1,828	6,569
December, 1934	..			3,381	1,576	4,957
„ 1935	..			4,969	1,898	6,867
Three weeks ended January 18, 1936	..			2,067	1,181	3,248

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BIRMINGHAM AND YORKSHIRE AREAS

		<i>Birmingham</i>	<i>Leeds</i>	<i>Bradford</i>	<i>Halifax</i>
October, 1934	..	5,293	2,533	1,898	553
„ 1935	..	5,831	2,966	1,802	538
November, 1934	..	5,152	2,259	1,536	455
„ 1935	..	5,785	2,562	1,777	502
December, 1934	..	5,144	2,204	1,701	491
„ 1935	..	6,680	2,808	1,837	516
Three weeks ended					
January 18, 1936		3,854	2,009	1,121	334

The number of sides graded and marked in 1935 showed an appreciable increase over the number for 1934, the figures being 371,674 as compared with 297,580, an increase of 74,094 sides.

Fat Stock: Carcass Sales by Grade and Dead Weight.—The following table shows the grading of the carcasses dealt with under this scheme in 1935 as compared with 1934 :—

<i>Carcass Grade</i>	<i>Year</i>	<i>Cattle</i>	<i>Sheep</i>	<i>Pigs</i>
Grade I	1935	3,082*	12,710	3,866
„ I	1934	1,760†	7,297	722
„ II	1935	6,272	11,914	3,024
„ II	1934	3,972	9,812	676
„ III	1935	1,297	2,329	305
„ III	1934	1,241	2,923	74
Ungraded	1935	225	716	67
„	1934	270	1,076	17
Total	1935	10,876	27,669	7,262
„	1934	7,243	21,108	1,489

* Includes 18 bullocks and heifers Super Grade.

† Includes 22 bullocks and heifers Super Grade.

There was a fairly general increase in the volume of stock dealt with at all the centres in 1935. Progress was particularly noticeable in Yorkshire, where the York and District Farmers Auction Mart Company continued their policy of utilizing the scheme as an alternative market for the disposal of their members' stock. This Company operates mainly in conjunction with the Leeds area, where the development is shown by the following figures :—

	<i>Cattle</i>		<i>Sheep</i>		<i>Pigs</i>	
	1935	1934	1935	1934	1935	1934
Leeds area	3,618	945	3,820	2,168	1,887	207

The increase in the number of pigs dealt with at all centres in 1935 was more marked than in the case of cattle and sheep. In general, producers tend to use the scheme for one class of stock only. The increase in pigs, as well as in cattle and sheep, is evidence that the scheme is of service to a wider body of producers.

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Whilst senders in some localities are particularly satisfied with the prices realized under the scheme for the best classes of cattle, senders in other localities are more favourably impressed by the prices obtained for cattle of lower qualities. The explanation is not far to seek. One locality may be regularly visited only by buyers who look to that particular area for stock of a high quality; another will similarly attract buyers of stock of lower qualities. In the former, the competition for the top grades is keen and local prices for the best stock will be relatively higher than those for stock of inferior qualities. In the latter, the inferior grades of stock will be disposed of locally at prices which are relatively more advantageous than those for the best classes of stock. The Grade and Dead Weight Scheme provides the highest available prices for gradable stock of a wide range of quality and is accordingly of particular benefit to a producer who finishes stock which may differ either in class or quality from the general run of stock in his district.

In addition to affording an alternative market for fat stock, the scheme provides up-to-date market intelligence to producers who obtain quotations. Over 4,000 separate quotations were issued in 1935; and, in a very substantial number of cases, producers also ascertained ruling market prices by telephoning to the Ministry's grading offices. There is ample evidence that farmers who took advantage of this information regarding market prices were in a stronger position when wishing to sell stock locally. The effects of the scheme cannot, therefore, be measured solely by the numbers of stock handled.

National Mark Caerphilly Cheese Scheme.—As a result of a number of meetings of authorized packers of National Mark Caerphilly cheese held at Highbridge, Somerset, during December, arrangements have been made for the grading of Caerphilly cheese, under the National Mark Caerphilly Cheese Scheme, to be undertaken in future by independent graders appointed by the National Mark Caerphilly Cheese Grading Committee which has been set up for the purpose. The remuneration and grading expenses of the graders will be covered by the grading fees paid by Caerphilly cheese packers authorized in the Scheme.

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The constitution of the Grading Committee, whose duties will include the supervision of the grading arrangements, is as follows:—Mr. A. G. Ridley (Chairman), Mr. E. A. Austin, Mr. A. G. Barber, Mr. G. B. Brown, Mr. J. R. Cox, Mr. R. G. Mapstone and Mr. P. L. Roberts.

Proposed National Mark Scheme for Lancashire and Leicester Cheese.—Satisfactory progress has been made in the investigations being carried out with a view to the introduction of National Mark Schemes for Lancashire and Leicester cheese. The schemes under consideration in respect of these varieties of cheese each provide for the independent grading of the cheese to which the National Mark will be applied, by a grader appointed by a Grading Committee and remunerated from the grading fees paid by packers authorized in the scheme.

National Mark Schemes for Fresh Vegetables.—In pursuance of a resolution which was adopted at the last meeting of the National Mark Vegetables Trade Committee, the following two sub-committees of the Trade Committee have recently been formed for the purposes indicated below:—

(1) *Research Sub-Committee.*—This sub-committee will advise the Trade Committee on problems affecting the marketability of vegetables, e.g., cold storage, etc. It will consist of members of the Vegetables Trade Committee, together with representatives of the Markets, Research and Education Divisions of the Ministry, the Department of Scientific and Industrial Research, and the Agricultural Research Council.

(2) *Packages and Transport Sub-Committee.*—The large variety of containers at present in common use for the conveyance of fresh vegetables renders it impracticable for the Trade Committee to make a detailed examination of container specifications.

An exhaustive investigation of the subject will therefore be undertaken by this sub-committee with the ultimate object of recommending the adoption by the industry of a limited number of national standard packages.

British Industries Fair.—The Ministry is staging an exhibit of National Mark products at the British

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Industries Fair, which is to be held at Olympia from February 17 to 28. The display will include canned and bottled fruit and vegetables, honey, cider, jam, Cheshire, Cheddar, Stilton and Caerphilly cheese, creamery butter, wheat flakes and such fresh fruits and vegetables as are in season. Samples of various National Mark commodities will be on sale, and a full range of the Ministry's publications will be available at the bookstall.

Germany: Food Supply Situation.*—Recent reports and statements—in particular, the last weekly report, for 1935, of the German Institute for Business Research—confirm the serious shortage of meat and fats in Germany. The radical change in the position—a matter of much surprise in view of the over-abundant supplies of pigs a year ago, and the adequate supplies of butter in the earlier part of the year—is officially attributed to the poor fodder harvest of 1934, the consistent decrease, over a period of years, in the imports of concentrated feed, the consequential decline in the number and slaughter weight of pigs and cattle, and the fall in milk production.

As regards future prospects, the report states that the increase in pig numbers, now in progress, will relieve the meat and fats situation by next spring; but that much will depend upon the fodder harvest of 1936 and the capacity of Germany to continue to pay for her imports of fats (constituting 50 per cent. of total supplies), and, in addition, large quantities of concentrated feed. Moreover, in 1936, for the first time for many years, it has been found necessary to resume imports of frozen beef from South America to fill the gap of 10 per cent. in the supplies of beef resulting from the excessive slaughter of cattle and calves in 1934 and 1935. It would appear, therefore, that unless Germany can expand her export markets, the meat and fats situation is likely to continue precarious.

One of the consequences of the shortage of meat and fats is an inadequacy of the supplies of eggs and cheese which are being used to overcome the dearth of meat, sausage and bread spreads. The supplies of cold store eggs have already been exhausted, whereas, last year, they were still being drawn upon up to the middle of February; and it has been necessary to increase imports. The shortage is attributed not to decreased supplies—it is estimated that supplies are greater than a year ago—but to increased demand resulting not only from the shortage of meat, but also from the operation of the egg price control, which has resulted in a much narrower margin than hitherto between summer and winter prices and has therefore encouraged an abnormally high demand in recent weeks. As regards cheese, the supply situation is partly due to heavier demand but, in addition, supplies have been adversely affected in the interests of butter production. In order to supplement the supplies of sour-milk cheeses—the sort favoured by the masses—curds are being imported from Czechoslovakia. It is officially anticipated that both the egg and cheese situation will shortly be easier.

Netherlands: Agricultural Policy.*—A Swiss review of Netherlands agricultural policy asserts that the fundamental structure of Netherlands agriculture is being changed in consequence of the crisis measures. Vegetable, fruit and bulb cultivation, butter and cheese

* Note by the Market Supply Committee.

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production and the meat and poultry industries, which depended for their success on a wide export market, are being sacrificed in favour of home-grown corn and fodder in an effort to limit the losses on the export trade and to render the country as independent as possible of imports of grain and feeding stuffs. The Minister of Agriculture has declared that, as a result of the crisis measures, arable land has increased and pasture land decreased by about 75,000 acres, the cattle herds have declined by 190,000 head, and pig holdings have been drastically reduced to the level of requirements.

A large proportion of the Netherlands farmer's costs consists of capital charges which, owing to the high capital value of the farms consequential upon the intensive agricultural methods, are very onerous. A great part of the subsidies is going therefore not to the farmer but to his creditors. Left to their own devices, many farmers, it is asserted, would certainly have lost their holdings, but this would have been in the general interest since the necessary reduction in costs would have resulted, and the rehabilitation of agriculture would have ensued. Netherlands agricultural policy, it is stated, must strive to reduce production costs so as to permit exports to expand since the entire production machinery of the country is equipped to serve a larger market than the home market.

Austria : Agricultural Policy.*—The Minister of Agriculture in a recent speech to representatives of the Tyrol farmers indicated the broad outlines of the Austrian Government's agricultural policy as follows :—

- (1) The encouragement of exports through "compensation" agreements. Such agreements had recently been concluded and more were contemplated.
- (2) The shortening of the route between the producer and the consumer without harming the traders' real interest with the object of securing to the farmer some influence with regard to the selling price of his product.
- (3) Increased consumption of milk at sufficiently low prices for even the poorest sections of the population. In this connexion large scale regulation of the sale and price structure of milk for Vienna is contemplated.
- (4) The abolition of the fodder import licence system and the protection of the livestock industry in the natural producing areas.

(Note —The fodder import licence system is opposed by the cattle raising industry for two main reasons. (i) under it, imports of fodder are unrestricted and give no right to compensatory export of Austrian produce ; (ii) the pig industry is developing to an undesirable extent as a result of such imports, and this is partly responsible for the reduced consumption of beef.)

In a later speech, the Minister outlined the Government's attitude to agricultural subsidies. He emphasized the fact that, for the most part, Austrian agriculture was carried on by small farmers under difficult conditions as regards soil and climate. For that reason, and because the crisis in Europe has caused difficulties in regard to sales and prices too great for the individual farmers to master, it would be the duty of the Government to frame special measures in regard to technique of production, organization and trade policy. For the carrying out of measures of this kind the provision of public funds would be necessary and justifiable, especially if through their application lasting benefit and profit were to be secured, whether in the support

* Note by the Market Supply Committee.

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and maintenance of threatened farms or improving prices and marketing conditions. It must, however, be an essential condition of these measures that they fit in, on the one hand, with natural conditions, and, on the other hand, with agricultural policy.

Following this principle, it was also justifiable to expend public funds on the education and training of the farmer and especially agricultural students. Moreover, if the farmer were called upon to make changes in production and introduce new production methods, he could not be expected to do so at his own expense. Public money must, therefore, be provided for experimental purposes, introducing new methods in production, opening up new branches and sources of revenue, establishing model farms, etc. Contributions will also be necessary for organization measures to overcome difficulties in regard to prices and marketing.

FEBRUARY ON THE FARM

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Sheep.—February is a critical month for the ewe flocks. In early districts lambing is in full swing. On grass farms, early lamb production is the exception rather than the rule, though it is increasing in popularity. Where mountain breeds are used for early lamb production from grass flocks, the ewes have to be down from the uplands for at least one season, so that the lambs can be weaned, or sold early; by taking the lambs off the ewes towards the end of May, tupping may take place in August. This is more difficult than it sounds. Many owners of grass flocks have consistently failed to get early lambs in spite of disposing of the previous crop of lambs early, and the tups running with the ewes all summer. It is probable that the overfat condition of the ewes might be the cause of some of the failures. Some authorities recommend that, for early tupping, the ewes should be put on poor grass land after weaning and kept off the better pastures until about mid-July. This is almost impossible, however, on many farms, as the pastures are generally all of about the same quality.

Lambing pens are not used for grass flocks. Even for February lambing, good hedges or banks provide sufficient shelter for the sheep of the hardier breeds. The ewes, however, are sometimes brought for the night to a building, such as a barn, in order to facilitate good inspection with a lantern last thing at night. With large flocks, or if the sheep are wild, it is doubtful if there is much benefit in this. In cold, wet weather, the lambs of lowland or cross-bred sheep need much greater care just after lambing than those of mountain ewes; they soon get lifeless through cold if unable to suck at once.

Even in grass flocks, ewes lambing this month should receive supplementary feeding. Mountain ewes do not take readily to hay or to trough feeding; swedes,

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mangolds or kale, thrown out each day, help the ewes to keep up a good flow of milk. Marrow-stem kale is not very suitable for sheep because, unlike cattle, they are unable to take the stems between the molars to fracture them before nibbling them. In late flocks, care in February and March may make a lot of difference to lambing returns. The effects of bad weather are now making themselves felt on the hills, and young ewes should be brought to better pastures to enable them to milk better after lambing; hill sheep that have little milk at lambing are apt to desert their lambs. Weakly ewes should also be brought down for better keep with the younger ones.

In some grass flocks, prolonged wet weather when the ewes are heavy in lamb may be indirectly responsible for losses caused through wrong presentation at lambing. The ditches, through which the sheep can usually walk without difficulty, are brim-full of water, and the sheep jump these if insufficient care is exercised in the use of dogs. These big jumps, taken hurriedly, are apt to cause a displacement of the lamb in the uterus. Losses of this kind can be reduced by making a few small bridges, from a couple of old railway sleepers for instance. On farms near towns, where there is much trespass by straying dogs, the provision of ample crossing places is important if the fields have any wide, open ditches.

Work on the Land.—After a wet autumn wheat may have to be sown in spring in spite of opinions as to the profitability or otherwise of spring wheat. It is recommended from the National Institute of Agricultural Botany, that, if wheat has to be sown at this time of the year, Little Joss is suitable if it is drilled before the end of the month, but that Red Marvel should be used if sowing is delayed until the first half of March; for sowing after this, April Bearded is recommended. It is possible that, in a few years, the position as regards the profitability of spring wheat may be changed if developments in " vernalization " take place. This process, explained by Mercer in this JOURNAL for July last, may make it possible for our winter wheats to be made suitable for spring sowing by keeping the seed at a low temperature for some

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time before sowing. Spring beans, though not so certain as the winter varieties, because of the possibility of aphid attack, are not so much of a gamble as spring wheat. Peas and vetches may be sown this month, but apart from special reasons there is little to be gained from sowing these crops very early. Where oats are to be sown early, the variety Marvellous is suitable. This strong-strawed variety is hardier than the average spring oat; although suitable for early and late winter sowing, this variety is one of the earliest to ripen if sown on the same date as the ordinary spring varieties.

It is important to dress the seed of these crops in order to protect them from birds for a short time after sowing. This is particularly so if early sowing is unusual in the district; crops that are sown or that mature before the average, come in for special attention from birds. It should be noted, however, that good drilling, in well prepared land, is one of the best protections against birds.

At the time of writing, the prospects for the timely cultivation of land for such early-sown crops do not appear bright. On the heavier land, the preparation of a tilth after weeks of rain will be almost impossible if frost does not intervene. During the preparation some years ago of a piece of heavy land, after similar conditions, when a heavy stone roller and disc harrow were being used for breaking down the clods, ten operations were required, including the harrowing, before anything like a tilth was obtained; even at the finish, the soil, instead of being "floury," was more like a heap of "pills."

Breaking-in Horses.—February is a very suitable month for starting to break-in young horses. The advantage of starting this month is that the spring work is close at hand, and with its arrival there will not be many idle periods. Some favour November, because the short days are more lenient on the young horse, and give it a chance of developing stamina in time for the spring work. The diminution in the number of horses has played havoc with the calling of horse-breaking. There are fewer who specialize in the work, and a greater proportion of it is carried out by farm men.

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While the essential features of what a horse has to learn are the same over most of the country, local custom is responsible for certain differences in detail. Thus, in Aberdeenshire, horses are trained to "follow"; a man carting swedes for instance, in addition to having his own horse and cart, would have another horse behind. This probably arises from the custom of regarding a pair of horses as allocated to a man, the two having to be with him wherever he worked. Again, in parts of Yorkshire, only one rein is used—the "ya" string, this being attached to the left horse of a pair. A turn can be indicated not only by word of command, but by the manner in which the string is tugged.

Pests.—Since many pests such as moles, rats, rabbits and pigeons will soon reach their breeding season, it is important not to relax destructive efforts this month. The lower prices ruling for rabbits, pigeons and mole skins make it all the more necessary not to leave things to chance. When mole skins were sold for 1s. 1d. each during the Great War, they were caught despite the dearth of men; now, the farmer must take the initiative, and not expect prospective catchers to call round asking for permission to go on his land.

In some districts mole catchers are paid by the number of tails brought in, whereas in others, they are engaged co-operatively, and farmers pay on an acreage basis. The latter is the more satisfactory method, because the best way of dealing with the pest is not to catch one here and there in minor runs, but to set traps or bait in the main connecting lines. A catcher, working on a number of farms at the foot of a slope, when asked his opinion on these two systems of payment, remarked that most of his catches were made on a few trunk lines leading to the lower ground; these were situated in one farm, but served the moles in several holdings.

The mole is not without its good points. In an investigation on the food of the mole carried out from this College (P. B. White, this JOURNAL, August, 1914) leather jackets and wireworms were found to the extent of 87 and 41 per cent., respectively, in the stomachs; it was estimated that 20 leather jackets

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were consumed every day. Moles have tremendous appetites, being capable of eating their own weight of food in a day. Professor Brambell, of this University, believes that failure to keep moles alive in captivity is mostly due to their being underfed, and finds that an easy way of keeping alive captive moles is to give daily to each the dead body of another as food. Again, it is said that their burrowing helps to drain the land, but it is difficult to concede this, since most of the runs are horizontal. During the past wet months their draining activities have failed to keep habitable for them many acres of flat land! They have had to migrate to the raised portions of land; in many instances, farmers have observed fresh hills that are several hundreds of yards away from the nearest sign of mole activity.

For Young Farmers.—The farmer is almost unrivalled for the opportunities he has for observation of plant and animal life, and the knowledge gained in this interesting way may be turned to financial account. The opportunity for observing Nature at work may be regarded as a compensation for the fact that farming, unlike other businesses, offers practically no chance of “getting rich.”

Through directing so much attention in recent years to yields and live-weight increase, there has been a tendency to become superficial in our observations, and to draw conclusions too hastily; observations made in this way lose much of their interest and educational value. To give an example, one may quote a survey of damage to fruit trees by late spring frosts. Bramley's Seedling might have been regarded as the most resistant variety of apple tree had the investigators drawn their conclusions from the yield of apples in one particular year when such a frost was experienced. The close observations of the investigators, however, revealed that the comparative immunity of this particular variety in that year was really due to the fact that it did not happen to be at the stage of flowering when the unformed pollen was in an unprotected state; had the frost arrived a little later, the results might have been very different.

Ample scope for intelligent observations is to be

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found in the study of the winter hardiness of the various strains of grasses, clovers and cereals. Damage to such crops by frost is not common in this country, and here, winter hardiness comprises mostly capacity for withstanding prolonged wet conditions, or temperatures not much above freezing point. In a volume recently published by the Russian Institute of Plant Industry, by a section of scientists who specialize in this subject, one article of particular interest is devoted to the effect of day length on hardiness. Plants that grow in the wild state in the regions where days are short become much less resistant to frost if introduced to places with longer days. Thus, a certain shrub growing in the Far East, with a day length of 14-15 hours, can stand undamaged a temperature of -30° C., but, near Leningrad, with its 18- or 20-hour day length, this plant succumbs under much less severe temperatures; if the day is artificially shortened by shading until it is only 14 hours, the plant becomes as frost-resistant in Leningrad as in the Far East. At the risk of committing the sin of a hasty deduction, one cannot but think of the relative suitability to our climate of strains of grasses from New Zealand, Scandinavia, etc.

Another important aspect of the Russian work is that from which it appears that the winter hardiness of a plant is affected by the pre-winter conditions, and that, for a given plant, it varies from week to week. Thus, plants, such as wheat, may "harden" if sown in time to experience a fairly low, but not too low, temperature, before the arrival of frost; if, however, it is sown too early, the plants pass the stage at which they can retain their hardiness, and become, once more, easily damaged. Plants are most vulnerable when the rudimentary ear is formed, towards spring.

As regards the variation in frost resistance during winter, the investigators measured this by counting the number of plants surviving out of 100 brought in from the field for freezing. Rye, the hardiest cereal, was found to acquire hardiness only gradually, but to lose it just as slowly. Wheat began to harden much later, quickly acquired its maximum capacity to resist frost, but just as quickly lost it.

NOTES ON MANURING

J. A. SCOTT WATSON, M.A.,

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The Placement of Fertilizers.—The writer has referred, in recent issues of these notes, to growing indications of the importance of the *placement* of fertilizers—i.e., to the possibility that the response to a given fertilizer may depend not only on its nature and amount but on the zone of the soil in which it is put. It was pointed out that sugar-beet, sometimes at least, gives a higher response to mineral fertilizers when these are ploughed in before seeding, and that corn crops may do better when the fertilizer is drilled with the seed rather than when it is broadcast on the surface and harrowed in. The problem is attracting the attention of investigators in a number of countries, and it seems worth while to attempt a short review of the present state of knowledge of the subject.

As regards nitrogen, it is well known that all the “artificial” forms are rapidly nitrified in warm moist soil, and that the resulting nitrate is quickly distributed throughout the soil and is easily leached out by drainage water. Any particular placement of the nitrogen fertilizer can therefore have only a very temporary effect, and it would seem that all that can be achieved is so to place the fertilizer that the crop roots will be able to tap the supply as quickly as possible, and before those of competing weeds. In fact the *timing* of the nitrogen application is much more important than its placement, the aim being to ensure that the crop is adequately fed during the whole of its feeding season, and that the amount of soil nitrate is kept at a minimum during those times when there are no actively-feeding roots in the soil. Hence there is often an advantage to be gained by late spring top-dressings of nitrogen, especially on light soils where the risk of leaching is greatest. The alternative method of spreading over the supply of nitrates is to use organic manures, which yield up their nitrogen by degrees over a longer or shorter period.

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Potash fertilizers, although they are all freely soluble in water, are much more firmly held by the soil than nitrates, and are, except on the lightest soils, subject to very little loss by leaching. The potash tends to stay more or less where it is put for a matter of weeks or months and may take a matter of years to penetrate down to the active roots of a fruit tree growing in a stiff soil. For annual crops, it would seem that the logical placement of a potash fertilizer would be in the zone of most active root action of the crop—i.e., some distance below the surface and not too far, laterally, from the seed.

Phosphoric acid is, upon the whole, fixed much more rapidly, and held much more tenaciously, than the other two nutrients, but the whole problem is much more complicated, and there is more variation in the result according to the nature of the soil and the particular form of phosphate that is applied. As illustrating the one extreme, the results may be quoted of a pot experiment carried out recently at the Colorado Station in the United States. The soil was of a highly calcareous type, the crop was lucerne and the fertilizer under experiment was superphosphate. When this was applied at a depth of $\frac{1}{2}$ in. the crop showed no response, the yield being no better than that of the unmanured pots. The same application (300 lb. per acre) placed at 1 in. depth more than doubled the yield of lucerne, and at 4 in. the increase in the crop was 179 per cent. over the control. No further increase was obtained by raising the application to 1,000 lb. per acre, or by burying the basal dressing at 6 in. depth. Another illustration was obtained by Gouchley in the United States, where the phosphate content of an orchard soil was examined layer by layer. It was found that applications of phosphate, the most recent of which had been made fourteen years previously, had not penetrated to ploughing depth, and were thus still above the zone of root action of the trees. As illustrating the other extreme, it has been shown that phosphates are so weakly held by certain Welsh mountain soils that they are subject, even under pasture conditions, to quite important losses by leaching.

The factors influencing the fixing of phosphoric acid

NOTES ON MANURING

in the soil are highly complex, but it seems that penetration is most rapid in those neutral or acid soils in which there is little active iron or aluminium. Free calcium carbonate, or active iron or aluminium, enter into firm combination with phosphoric acid, and the resulting compounds are, in the absence of acid, highly insoluble.

Various attempts are being made to obtain greater mobility of phosphoric acid in soils where the natural rate of penetration is very slow. Contrary to the old view, it seems that the phosphate of a basic slag (of high citric solubility) may penetrate certain soils more rapidly than that of superphosphate. Again certain phosphatic substances other than those now used as fertilizers have a higher degree of mobility in the soil, and are being tried experimentally as fertilizers. Another possibility is the application of acids and other substances to the soil, in order to make available the soil's reserves of phosphates and so make phosphate applications unnecessary.

Another possibility that is being explored relates specially to orchard trees, for which it is necessary that the phosphate (and also the potash) should reach a considerable depth. The method is to dissolve the fertilizer in water and to inject the solution straight into the subsoil. A hollow lance, pierced with four holes just above its point, is driven into the soil to a depth of about 16-18 in. and is connected up with a power-spraying pump. About ten separate points are injected within the branch range of each tree, and apparently satisfactory penetration of the fertilizer is obtained.

Apart from the aim of placing the fertilizer within easy reach of the crop roots, the other relevant point is to avoid the risk, by too highly concentrated a solution, of damage to the tender tissues of the seedling plant. For example, it is not an uncommon thing to find potatoes, that have been planted directly on top of large amounts of soluble fertilizer, with their sprouts "burnt" by the manure. The risk of such damage varies, of course, with the type of plant, the amount and solubility of the fertilizer and the amount of moisture present in the soil. It is obvious, then, that the best placement of fertilizer must be discovered, for

NOTES ON MANURING

each crop and for each district, by means of field trials.

The National Fertilizer Association of America has given a great deal of attention to the subject, and a summary of the conclusions reached may be of interest. With maize, which is grown in "hills" about 3 ft. 6 in. apart both ways, application in the rows or in the hills (i.e., round the base of the plants) has given better results than broadcasting. With cotton, at least on light soils, application at the sides of the drill rows, below the surface but 2 or 3 in. away from the seed, was found to be safer and more efficient than placing the fertilizer under the seed, or mixing the fertilizer with the soil along the drill rows. For potatoes, it has been found best to apply the fertilizer in a narrow band about two inches below the sets, or in two bands rather below the level of the sets and about 2 in. away from them on either side. Application immediately under the sets and in contact with them—a method commonly used—was found to be unsatisfactory. Mixing the fertilizer with the soil in the rows (by broadcasting over the ridges before splitting these back over the sets) was also found to be undesirable. The usual light dressings used for wheat, barley and oats gave the best results when the fertilizer was mixed with the seed, or else placed in the immediate vicinity of the seed. Broadcasting the fertilizer and harrowing it into the soil was found to be a less efficient method. With peas and beans, on the other hand, it was found that contact between the seed and the fertilizer should be avoided, on account of the risk of damage to the seedlings. The best results, with these crops, were obtained when the manure was drilled on both sides of the row of seeds, and some two or three inches away from it.

In this country, apart from the work on sugar-beet and on cereals discussed in previous notes, there are some interesting results obtained by Bates on the placement of fertilizers for potatoes.* In these trials, the fertilizer was applied to the control plots broadcast, after a light scuffling of the soil. On the other plots, the fertilizer was sown in a band along the bottom of the potato drills and again scuffled into the soil. In

* *Norfolk County Bulletin*, No. 1, 1934.

NOTES ON MANURING

three separate experiments, the latter treatment produced yield increments, over the controls, of 1.2, 1.8 and 0.9 tons, respectively, the increases being definitely significant in each case. It is pointed out by Bates that the area in which the trials were conducted is a dry one, and that the applications of fertilizer were fairly heavy.

In certain parts of the country, farmers are already convinced that, where fairly heavy dressings are applied to potatoes, the fertilizer should be placed near to, but out of actual contact with the sets. This they achieve by setting up the ridges rather higher than would otherwise be necessary, by sowing the fertilizer in the bottom of the furrows and then dragging down enough soil from the ridges to cover the fertilizer to the depth of an inch or two. The sets are then planted on top of this soil covering.

On the whole, therefore, there is sufficient evidence of the importance of the subject to justify a good deal of further experimental work in this country.

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended Jan. 15				Cost per Unit at London
	Bristol	Hull	L'pool	London	
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of Soda (N. 15½%) ..	7 12d	7 12d	7 12d	7 12d	9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of Lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-Chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of Ammonia :—					
Neutral (N. 20 6%) ..	7 2d	7 2d	7 2d	7 2d	6 11
Calcium Cyanamide (N. 20·6%)	7 1e	7 1e	7 1e	7 1e	6 10
Kainite (Pot. 14%) ..	2 18	2 15	2 15	2 15	3 11
Potash Salts (Pot. 30%) ..	4 18	4 15	4 13	4 15	3 2
" " (Pot. 20%) ..	3 15	3 12	3 10	3 12	3 7
Muriate of Potash (Pot. 50%) ..	7 18	7 16	7 12	7 16	3 1
Sulphate " " (Pot. 48%) ..	9 8	9 6	9 2	9 6	3 10
Basic Slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Grd. Rock Phosphate (P.A. 26 -27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%) ..	2 19	..	2 19f	2 16g	3 6
" " (S.P.A. 13½%) ..	2 15	2 13	2 15f	2 12g	3 10
Bone Meal (N. 3½%, P.A. 20½%) ..	..	6 17	6 5h	6 5	..
Steamed Bone Flour (N. 4½%, P.A. 27½-29½%) ..	5 12	5 5	5 2h	5 2	..

Abbreviations N= Nitrogen, P.A.=Phosphoric Acid;

S.P.A.=Soluble Phosphoric Acid; Pot.=Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra, and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails 1s. 3d. extra.

h Prices shown are f.o.r. Appley Bridge.

NOTES ON FEEDING

W. B. MERCER, M.C., B.SC. (Principal) and
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Hay Values.—It is passing strange that the development of grass drying—which implies high labour charges—should be going on simultaneously with the extension of the practice of baling hay in the field. Three good harvest years in succession have given a fillip to this practice in the north-western counties. Whether the pioneers who have adopted it will find the method workable in poor seasons, remains to be seen. Meantime they can justly claim that by baling in the field, under suitable weather conditions, higher quality hay can be secured more expeditiously than by old-fashioned methods; a good half-way product between ordinary meadow hay and artificially dried grass can apparently be produced, since it is possible to bale young hay long before it is bleached.

Exact estimation of costs and returns for baled hay is almost impossible. Hay of any kind is a notoriously difficult costing subject; and were the sole object of costing the calculation of a unit price, we should be inclined to despair of costing. It is not merely that unit costs cannot be calculated for a food of variable composition—indeterminable indeed by any ordinary means. It is necessary also to bear in mind considerations of time and space that do not lend themselves to monetary evaluation.

We write from an area in which meadow hay is often produced at a cost of over £5 per ton. Owing to the steep charges for farmyard manure and harvest labour, it is impossible to keep the cost per acre below £6 or £7, while yields do not on the average reach 30 cwt. A nominal reduction in costs could of course be achieved by stacking the hay in the field; whether there would be any real gain in piling up a stack in the field, to be thatched in autumn and lugged home in winter and rough weather, is another matter.

Pawson and Wannop, reporting on a useful meadow

NOTES ON FEEDING

hay trial on *hill* land, call attention to another factor to be reckoned with on occasion when judging costs. Certain farms are so placed that it is impracticable to purchase hay or other bulky fodder. Heart searchings on costs per unit of starch equivalent and so forth are of little avail in such instances.

The aftermath constitutes one of the standing difficulties of costing practice, the customary way out consisting in deducting its assumed value from the gross costs per acre—£1 per acre is a common deduction in the better grazing areas. Information derived from pasture trials may be useful as a check here.

Pastures cut at intervals of about a month for the past few years at Reaseheath have shown the following results (in round figures):—

		<i>Yield from cuts before June 20 % of Total</i>	<i>Yield from cuts after June 20 % of Total</i>
Temporary	.. ..	75	25
Permanent	.. ..	40	60

The actual proportions vary a good deal from year to year, but it is evident that very different allowances for aftermath-value ought to be made in the two types of grass land. No standard figure can fairly represent aftermath value. The fairest method of allowing for post-harvest growth would appear to be to deduct an appropriate percentage from the total costs other than those of harvesting.

Feediness.—Uncle Sam is not to be left undisputed king of word inventors. There are young men in New Zealand with eyes on the title. In the latest report of the Department of Scientific and Industrial Research—an exhilarating record of progress in “practical” science—the word “feediness” makes its bow to the English public, though not in the usual dress of a debutante, inverted commas. Judging by the context, it means the flavour in milk or cream attributable to food. It is not a particularly attractive word; but neither is the food flavour.

New Zealand butter factories experience a good deal of trouble, from time to time, with taints arising from certain weeds and food plants; until recently, it was not known whether they were transmitted through the milk itself or through bacterial contamination. Care-

NOTES ON FEEDING

ful investigation has now set that matter at rest. White, red and trefoil clovers are the direct cause of a food taint in cream, the "feediness" of the latter depending on the amount and condition of the clover, and the lapse of time between active grazing and milking. The readiest means of avoiding "feediness" lies, apparently, in encouraging grassiness in the paddocks. English cheesemakers will hear with interest this echo, from "down under," of their long established belief.

The announcement will doubtless revive the turnip controversy, which still stands much where it stood twenty years ago. All Brassicas are capable of tainting milk, and under the ordinary conditions of the farm it is scarcely possible to rule out any one of three possible routes—the cow, the dung that gains access to milk, and the atmosphere of the cowshed. Our own impression, after many years' experience in trying to produce clean milk, is that where reasonable care is exercised in methods of production, the atmosphere is the commonest source of infection. It is difficult entirely to avoid a "turnipy" smell in cowsheds when any member of the turnip tribe is being used. The acknowledged fact that excessive use of such foods is more likely to lead to taints than use in small quantities does not necessarily implicate the cow; the more turnips are used, the more does the turnip flavour permeate the building.

Other Taints.—As the accredited milk scheme progresses it becomes possible for educational staffs of local authorities to form a clearer idea than was hitherto possible of the commonness or otherwise of milk taints and their causes. In our own experience, food taints are not common. Such as do occur are usually attributable to one of two causes—milk vessels and stale-calved cows. Cows approaching the end of their lactation not infrequently yield milk of high bacterial content and tainted flavour, though there may be no clinical signs of garget. We have on occasion, indeed, been compelled to draft (as fat stock, be it said!) apparently healthy cows from our own herds for the sole reason that they yielded defective milk at the end of their lactation. Speaking generally a "garget taint" differs from taints acquired from foods in that

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it does not tend to disappear on standing; it is readily identifiable by a trained palate.

“Copper taints” are rare considering the indifference with which milk producers regard the disappearance of tinning from their coolers. Recent research finds the explanation of this taint in a curious combination of biological and chemical action—while the proximate cause of the taint is disintegration of milk fats through reaction with copper; the process is limited by bacterial growth; anything that limits bacterial action in the milk therefore facilitates taint development; hence rapid cooling is undesirable if the cooler is defective.

The investigations have perhaps some bearing on the general problem of milk flavour. New milk has a flavour and aroma all its own; both flavour and aroma are largely destroyed by cooling. Some good judges in such matters aver that the post-cooling flavour depends on the degree of cooling, that brine-cooled milk is recognizable as such by its taste. Such niceties cannot be judged by the ordinary lay public—nor will they be as long as the public smokes as freely as at present. It is easy for the unbeliever to express his incredulity that such fine shades of flavour actually exist; but if aerating and cooling rates, through their influence on the bacteria, can control the action of copper on milk fats, it is more than possible that they can, through the same flora, influence normal flavour.

Big Fleas and Little Fleas.—Most of us visualize bacteria as destructive agents; whether they are parasitic or saprophytic their role is generally concerned with dissolution. Life, however, is not all blood-sucking for the little fleas. Round every corner of their microscopic world there lurk big fleas in the shape of protozoa—as we may know from a study of nitrate formation in soils. Also there are lesser fleas, known as bacteriophages, able in some strange way to parasitize the parasites. Dairy researchers in New Zealand have stumbled on a new type of bacteriophage. It occurs in cheese and butter starters, and in some instances at least affords a “complete explanation” of the way in which starter “goes off.” Earlier work had shown that the failure of starters was connected

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with aeration; apparently this stimulates the bacteriophage, which "flares up and actually dissolves the bacteria in the starter." It has not yet been found possible to exploit the new knowledge in dairy practice; but it would seem that we are now approaching the solution of a very formidable problem.

The Fat in Milk Mystery.—A fearful mystery surrounds the dairy cow throughout the hours of darkness. During the day, she is quite prepared to give milk containing 4 per cent. of fat, milk her when you will. Leave her alone for a night, however, and you will be lucky to find 3 per cent. next morning. What happens during those dread hours? Who or what steals the cream? Of course, we know it is longer from 4 to 6 than it is from 6 to 4—but that does not account for the whole of the difference. K. W. D. Campbell who has looked into the matter at Reading says it is due to the night factor (he doesn't say whether the night factor means darkness or spooks) while people who go to the Dairy Show at midnight say it is all a matter of exercise—they aver that all zealous Friesians get up at twelve and go for a walk, and then lie down again.

K. Hartley and D. W. H. Baker (of Nigeria) explain the nocturnal disappearance of fat in an altogether different way. They say it does not happen. They say, in fact, that throughout the wet season, morning's milk is richer than evening's. Of course, they are talking about Zebu cattle, not Shorthorns or Friesians, and apparently 200 gallons a year is a good yield for Zebus. We should have thought that the night was quite as terrifying in Nigeria as in England. We should have thought—but you had better read the tale for yourselves. It is set forth clearly in the September issue of the *Journal of Dairy Research*.

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Wheat, British ..	6 8	0 8	6 0	72	1 8	0·89	9·6
Barley, British feeding	5 10	0 8	5 2	71	1 5	0·76	6·2
„ Canadian No.3							
„ Western ..	5 7	0 8	4 19	71	1 5	0·76	6·2
„ Persian ..	5 7	0 8	4 19	71	1 5	0·76	6·2
„ Russian ..	5 7	0 8	4 19	71	1 5	0·76	6·2
Oats, English, white	6 3	0 8	5 15	60	1 11	1·03	7·6
„ „ black							
„ „ and grey	6 0	0 8	5 12	60	1 10	0·98	7·6
„ Scotch, white ..	6 12	0 8	6 4	60	2 1	1·12	7·6
„ Canadian, No. 2							
„ Western ..	7 5*	0 8	6 17	60	2 3	1·21	7·6
„ Canadian, No. 3							
„ Western ..	5 18§	0 8	5 10	60	1 10	0·98	7·6
„ Canadian,							
„ mixed feed	5 18	0 8	5 10	60	1 10	0·98	7·6
Maize, Argentine ..	4 10	0 6	4 4	78	1 1	0·58	7·6
„ Gal. Fox ..	4 5†	0 6	3 19	78	1 0	0·54	7·6
„ South African,							
„ No. 4, yellow,	4 8†	0 6	4 2	78	1 1	0·58	7·6
„ South African,							
„ No. 2, white, flat	4 8†	0 6	4 2	78	1 1	0·58	7·6
Beans, English,							
„ Winter	5 15§	0 16	4 19	66	1 6	0·80	19·7
Peas, English, Blue ..	9 0§	0 14	8 6	69	2 5	1·29	18·1
„ Indian ..	9 0†	0 14	8 6	69	2 5	1·29	18·1
„ Japanese ..	17 17†	0 14	17 3	69	5 0	2·68	18·1
Dari	7 0†	0 7	6 13	74	1 10	0·98	7·2
Milling Offals—							
„ Bran, British ..	6 0	0 15	5 5	43	2 5	1·29	9·9
„ „ broad ..	6 7	0 15	5 12	43	2 7	1·38	10·0
„ Middlings, fine,							
„ imported	5 17	0 12	5 5	69	1 6	0·80	12·1
„ Weatings† ..	6 2	0 13	5 9	56	1 11	1·03	10·7
„ „ superfine†	6 15	0 12	6 3	69	1 9	0·94	12·1
„ Pollards, imported	5 10	0 13	4 17	50	1 11	1·03	11·0
Meal, barley ..	6 12	0 8	6 4	71	1 9	0·94	6·2
„ „ grade II	5 17	0 8	5 9	71	1 6	0·80	6·2
„ „ maize ..	5 5	0 6	4 19	78	1 3	0·67	7·6
„ „ South							
„ „ African	5 0	0 6	4 14	78	1 2	0·62	7·6
„ „ germ ..	5 2	0 10	4 12	84	1 1	0·58	10·3
„ „ locust bean ..	7 15	0 5	7 10	71	2 1	1·12	3·6
„ „ bean ..	8 0	0 16	7 4	66	2 2	1·16	19·7
„ „ fish (white) ..	14 15	2 0	12 15	59	4 4	2·32	53·0
Maize, cooked, flaked	5 15	0 6	5 9	84	1 4	0·71	9·2
„ „ gluten feed ..	5 5	0 12	4 13	76	1 3	0·67	19·2
Linseed cake—							
„ English, 12% oil	8 0	0 19	7 1	74	1 11	1·03	24·6
„ „ 9% „	7 10	0 19	6 11	74	1 9	0·94	24·6
„ „ 8% „	7 5	0 19	6 6	74	1 8	0·89	24·6
„ „ 6% „	7 12§	0 19	6 13	74	1 10	0·98	24·6

PRICES OF FEEDING STUFFS (*continued*)

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
Soya-bean cake, 5½% oil	£ s. 8 2½	£ s. 1 7	£ s. 6 15	69	s. d. 1 11	d. 1·03	% 36·9
Cottonseed cake, English, Egyptian seed, 4½% oil ..	4 12	0 17	3 15	42	1 9	0·94	17·3
Cottonseed cake, Egyptian, 4½% oil	4 6	0 17	3 9	42	1 8	0·89	17·3
Cottonseed cake, decorticated, 7% oil	7 0†	1 6	5 14	68	1 8	0·89	34·7
Cottonseed meal, decorticated, 7% oil	7 2†	1 6	5 16	70	1 8	0·89	36·8
Coconut cake, 6% oil	6 5	0 17	5 8	77	1 5	0·76	16·4
Ground nut cake, decorticated 6-7% oil	7 7	1 6	6 1	73	1 8	0·89	41·3
Ground nut cake, imported decorti- cated, 6-7% oil ..	6 15	1 6	5 9	73	1 6	0·80	41·3
Palm-kernel cake, 4½-5½% oil ..	6 2†	0 11	5 11	73	1 6	0·80	16·9
Palm-kernel cake meal, 4½% oil ..	6 0†	0 11	5 9	73	1 6	0·80	16·9
Palm-kernel meal, 1-2% oil	5 12	0 11	5 1	71	1 5	0·76	16·5
Feeding treacle ..	4 12	0 8	4 4	51	1 8	0·89	2·7
Brewers grains, dried ale	4 15	0 10	4 5	48	1 9	0·94	12·5
Brewers' grains, dried porter	4 7	0 10	3 17	48	1 7	0·85	12·5
Dried sugar beet pulp (a)	5 7	0 5	5 2	66	1 7	0·85	5·2

(a) Carriage paid in 5-ton lots.

* At Bristol.

§ At Hull.

† At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the beginning of January, 1936, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton, as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 5d. Dividing this again by 22·4, the number of pounds of starch equivalent in one unit, the cost per lb. of starch equivalent is 1·29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such

FARM VALUES OF FEEDING STUFFS

calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices:—
N, 6s. 10d.; P_2O_5 , 2s. 1d.; K_2O , 3s. 4d.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows:—

	<i>Starch equivalent</i>	<i>Protein equivalent</i>	<i>Per ton</i>
	<i>Per cent.</i>	<i>Per cent.</i>	<i>£ s.</i>
Barley (imported)	71	6·2	5 7
Maize	78	7·6	4 10
Decorticated ground-nut cake ..	73	41·3	7 1
„ cottonseed cake ..	68	34·7	7 0

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1·32 shillings, and per unit protein equivalent, 1·52 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The "food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the December, 1935, issue of the Ministry's JOURNAL, p. 955.)

FARM VALUES

Crop	Starch equivalent	Protein equivalent	Food value per ton, on farm
	Per cent.	Per cent.	£ s.
Wheat	72	9·6	5 10
Oats	60	7·6	4 11
Barley	71	6·2	5 3
Potatoes	18	0·8	1 5
Swedes	7	0·7	0 10
Mangolds	7	0·4	0 10
Beans	66	19·7	5 17
Good meadow hay	37	4·6	2 16
Good oat straw	20	0·9	1 8
Good clover hay	38	7·0	3 1
Vetch and oat silage	13	1·6	1 0
Barley straw	23	0·7	1 11
Wheat straw	13	0·1	0 17
Bean straw	23	1·7	1 13

* Obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE general index number of the prices of agricultural produce for December, viz., 114 (base 1911-13 = 100) was 1 point higher than that for both the previous month and for December, 1934. (If allowance had been made for payments under the Wheat Act, 1932, and the Cattle Industry (Emergency Provisions) Act, 1934, the revised general index for the month would have stood at 121.) Prices of all descriptions of fat stock showed seasonal rises, while those of potatoes and poultry also appreciated. Cereals and eggs were somewhat lower in price during the period under review.

Monthly index numbers of prices of Agricultural Produce. (Corresponding months of 1911-13 = 100)

Month	1930	1931	1932	1933	1934	1935
January.. ..	148	130	122	107	114	117
February	144	126	117	106	112	115
March	139	123	113	102	108	112
April	137	123	117	105	111	119
May	134	122	115	102	112	111
June	131	123	111	100	110	111
July	134	121	106	101	114	114
August	135	121	105	105	119	113
September	142	120	104	107	119	121
October	129	113	100	107	115	113
November	129	112	101	109	114	113
December	126	117	103	110	113	114

Grain.—The December average for wheat at 5s. 8d. per cwt. was 2d. below that recorded a month earlier and the index declined by 1 point to 77. (If allowance had been made for the “deficiency payment” under the Wheat Act, 1932, the index would have been 127.) Barley at 8s. 3d. per cwt. and oats at 5s. 10d. per cwt. also declined in price, the former by 4d. and the latter by 3d. per cwt., the respective indices falling from 101 to 100, and from 87 to 83. A year ago wheat averaged 4s. 10d., barley 8s. 7d. and oats 6s. 8d. per cwt., the indices being 66, 104 and 95 respectively.

MISCELLANEOUS NOTES

Livestock.—The average price of fat cattle was higher on the month, but the rise from 30s. 8d. to 32s. 6d. per live cwt. for second quality was less than during the base period, and the index consequently declined by 1 point to 91. (The effect of adding the cattle subsidy would have been to raise the index to 105.) The price of fat sheep at 9½d. per lb. for second quality was ½d. per lb. higher than in November, but as a relatively larger increase had occurred during the corresponding months of 1911-13, the index moved downward from 120 to 119. Baconers and porkers appreciated by 6d. and 9d. per score respectively, the index for the first-named showing a rise of 5 points to 98, while that for porkers advanced by 7 points to 110. A small increase was noticeable in the price of dairy cows, the index being 1 point more than in November, while store cattle also were a little dearer on the month and the index rose from 90 to 92. Store sheep, although a shade firmer in value, showed a reduction of 6 points, owing to a much larger increase in price in the base period. Store pigs averaged 28s. 7d. per head and were higher in both price and index.

Dairy and Poultry Produce.—No change took place in the regional contract prices of milk between November and December, the index remaining at 171. Quotations for farm butter and cheese also were unaltered. On account, however, of an increase in the price of butter during the base months, the index for that commodity fell from 97 in November to 93 in December. The index for cheese at 87 was the same as in the preceding month. A decline of 1d. per doz. in eggs was not reflected in the index, which appreciated by 1 point to 110; this compares with a figure of 97 recorded a year ago. Poultry prices were higher on account of the seasonal demand, and the combined index at 120 was 2 points more than in November and 10 points above December, 1934.

Other Commodities.—Average quotations for potatoes showed a rise of 19s. per ton, and the index advanced by 25 points to 185. Clover hay was unchanged in value, but meadow hay was slightly cheaper; the combined index, however, was unaltered at 84. Prices for wool moved upward by ¼d. per lb., but owing to a similar increase having taken place

MISCELLANEOUS NOTES

during the base period, the index at 91 continued at last month's level.

Monthly index numbers of prices of individual commodities. (Corresponding months of 1911-13 = 100.)

Commodity	1933	1934	1935			
	Dec	Dec.	Sept.	Oct	Nov.	Dec.
Wheat	61	66	64	80	78	77
Barley	111	104	121	110	101	100
Oats	75	95	90	89	87	83
Fat cattle ..	97	90	94	92	92	91
„ sheep ..	106	119	114	121	120	119
Bacon pigs ..	109	107	93	90	93	98
Pork „ ..	126	124	98	99	103	110
Dairy cows ..	106	103	105	107	103	104
Store cattle ..	85	82	88	90	90	92
„ sheep ..	86	99	124	120	121	106
„ pigs ..	147	148	122	124	129	131
Eggs	99	97	119	118	109	110
Poultry	110	110	117	117	118	120
Milk	166	171	215	171	171	171
Butter	97	82	89	95	97	93
Cheese	106	93	78	82	87	87
Potatoes ..	112	133	147	152	160	185
Hay	80	104	95	91	84	84
Wool	84	84	89	89	91	91

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act

Wheat	130	118	124	126	124	127
Fat Cattle ..		103	109	107	106	105
General Index ..	114	120	128	120	119	121

Advisory Leaflets

SINCE the date of the list published in the November, 1935, issue of this JOURNAL (p. 840), the undermentioned Advisory Leaflets have been issued by the Ministry :—

- No. 30.—The Gooseberry Sawfly (Revised)
- No. 42.—The Codling Moth. (Revised)
- No. 47.—Stinging Nettles. (Revised).
- No. 57.—Wingless Weevils. (Revised).
- No. 122.—Sugar-Beet Growing. (Revised)
- No. 224.—The Red Spider Mite (a) Glasshouse Crops. (Revised).
- No. 258.—Ropy Milk.
- No. 259.—The Leopard Moth.

Copies of any of the above-mentioned leaflets may be purchased from H.M. Stationery Office, Adastral

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House, Kingsway, London, W.C.2, or at the Sale Offices of that Department at Edinburgh, Manchester, Cardiff and Belfast, price 1*d.* each net (1½*d.* post free), or 9*d.* net per doz. (10*d.* post free).

Single copies of not more than 20 leaflets may, however, be obtained, free of charge, on application to the Ministry. Further copies beyond this limit must be purchased from H.M. Stationery Office, as above.

A list of the Ministry's publications, including leaflets, on agriculture and horticulture may be obtained free and post free on application to the Ministry.

Census of Production of Glasshouse Crops and of Vegetables, Flowers and Nursery Stock grown in the open

IN order to estimate the value of the output of agricultural and horticultural commodities in England and Wales, the Ministry of Agriculture has in the past, at intervals of about five years, made special inquiries in regard to the production of certain crops for which particulars cannot be calculated annually on the basis of the agricultural returns rendered by farmers each June. The last inquiry of this nature was made in 1930-31, and the Ministry arranged for a further inquiry to be made about the middle of January in respect of the output of certain crops during the year 1935. The inquiry covers two groups of commodities, viz., (1) Glasshouse produce, and (2) Vegetables, Flowers and Nursery Stock grown in the open.

Occupiers of agricultural holdings exceeding one acre will remember that the annual agricultural schedule, which they completed about June 4 last, in accordance with the requirements of the Agricultural Returns Act, 1925, contained a number of additional questions relating to the acreage of crops under glass, and of other crops not previously specified in the annual schedule. In a memorandum that accompanied the schedule, occupiers were asked to keep records of their output of these crops during 1935 for the purpose of furnishing to the Ministry the particulars of production now required.

The Ministry wishes to emphasize the special

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necessity that exists at the present time for the collection of the information that growers are asked to supply. Adequate statistics are now essential for the proper consideration, both by the Government and by farmers themselves, of the problems that arise in the horticultural industry in connexion with the measures that have been and are being taken for its improvement. The Ministry trusts, therefore, that growers will recognize their own interest in these inquiries, and will co-operate to the fullest extent by completing as far as possible the forms that are sent to them, and by taking care that the information they supply is accurate. *Every individual return will be regarded as strictly confidential*, and the information contained in it will not be divulged nor used except for statistical purposes. The inquiries are in no way connected with taxation.

The Ministry has issued two forms, one relating solely to glasshouse produce, and the other to vegetables, flowers and nursery stock grown in the open. The particulars required include the area from which the crops have been taken during the year 1935, the quantity sold and the amount of money realized on sale. Occupiers who produce crops under glass, and also grow horticultural crops in the open, should, therefore, receive both forms; if any grower of these crops had not received a form (or both forms if appropriate) by the end of January he should communicate with the Ministry at No. 7, Whitehall Place, London, S.W.1. The completed forms should be returned to the Ministry in the envelope provided as soon as possible, and not later than February 15. Occupiers who are unable to furnish all the information desired should supply as much as they can.

Importation of Sugar-beet and Mangold Plants

WITH the object of preventing the introduction, through the medium of imported plants, of certain virus diseases which have proved injurious to the sugar-beet industry on the Continent, the Minister of Agriculture and Fisheries has made an Order under the Destructive Insects and Pests Acts, 1877 to 1927, prohibiting, as from February 1, 1936, the landing

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in England and Wales from any country other than Scotland, Northern Ireland, the Irish Free State, the Isle of Man or the Channel Islands of any living plant of sugar-beet or mangold (*Beta vulgaris* Linn.) except under licence from the Ministry.

This prohibition does not extend to seeds, which may, as hitherto, be imported without any restrictions of a sanitary nature.

The Order, which is entitled the Importation of Plants (Amendment) Order of 1935, also prescribes that the health certificates required under the Importation of Plants Order of 1933 to accompany all imported plants must include a statement that the consignment does not contain any plant of sugar-beet or mangold.

Copies of the Order (S.R. & O. 1935, No. 1225) may be obtained either directly or through any bookseller from H.M. Stationery Office, Adastral House, Kingsway, W.C.2., price 1*d.* net.

Farm Workers' Minimum Rates of Wages.—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W.1, on Tuesday, January 14, 1936, the Rt. Hon. the Viscount Ullswater, G.C.B., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages and proceeded to make the following Orders.—

Lincolnshire (Kesteven and Lindsey).—An Order cancelling the existing minimum and overtime rates of wages and fixing fresh rates in substitution therefor to come into operation on January 26, 1936, and to continue in force until January 30, 1937. The minimum rates for male workers of 21 years of age and over are (1) *waggoners* 38*s.* per week of 52½ hours in the weeks in which Good Friday and Christmas Day fall, 61 hours in any other week from October 15 to May 13, and 58 hours in any other week during the remainder of the year; (2) *shepherds* 36*s.* per week of 45½ hours in the week in which Good Friday falls, 55 hours in any other week in summer, 47½ hours in the week in which Christmas Day falls and 56 hours in any other week in winter, with additional payments for the lambing season; (3) *stockmen* 37*s.* per week of 46½ hours in the week in which Good Friday falls, 56 hours in any other week in summer, 49½ hours in the week in which Christmas Day falls and 58 hours in any other week in winter, and (4) *other male workers* 32*s.* (instead of 31*s.* as at present) per week of 42 hours in the week in which Good Friday falls, 51 hours in any other week in summer, 39½ hours in the week in which Christmas Day falls and 48 hours in any other week in winter, with overtime in the case of all classes of male workers unchanged at 9*d.* per hour on weekdays and 11*d.* per hour on Sundays. For female workers of 17 years of age and over the minimum rate is unchanged at 5½*d.* per hour for all time worked.

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Staffordshire.—An Order varying the existing minimum and overtime rates of wages, the rates as varied to come into force on January 26, 1936. The minimum rates for male workers of 21 years of age and over are 32s. 6d. (instead of 31s. 6d. as at present) per week of 54 hours with overtime unchanged at 9d. per hour. For female workers of 18 years of age and over the minimum rate remains unchanged at 5d. per hour with overtime at 6d. per hour.

Worcestershire.—An Order fixing minimum and overtime rates of wages to come into force on March 2, 1936 (i.e., the day following that on which the existing rates are due to expire) and to continue in operation until February 28, 1937. The minimum rates for male workers of 21 years of age and over are 31s. as at present per week of 53½ hours in summer, except in the week in which Good Friday falls when the hours are 44½, and 48 hours in winter except in the week in which Christmas Day falls when the hours are 39½, with overtime unchanged at 9d. per hour. For female workers of 18 years of age and over the minimum rate is unchanged at 5d. per hour with overtime on Sundays and in excess of 8 hours on any other day at 5½d. per hour as at present.

Enforcement of Minimum Rates of Wages.—During the month ending January 13, 1936, legal proceedings were taken against three employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board, and against another employer for refusing to give information to one of the Ministry's Inspectors. Particulars of the cases follow.—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
Leicester ..	Ashby-de-la Zouch	£ s. d. 1 1 0	£ s. d. 0 5 0	£ s. d. 38 10 11	1
Notts ..	Mansfield ..	1 1 0	0 5 0	18 15 9	1
Surrey ..	Godalming ..	*5 0 0	—	—	—
Yorks, W.R. ..	Selby ..	1 0 0	—	5 0 0	1
Radnor and Brecon	Devynock ..	† —	4 0 0	10 0 0	1
		£ 8 2 0	4 10 0	72 6 8	4

* Refusing information.

† Dismissed under the Probation of Offenders Act.

Foot-and-Mouth Disease.—Further outbreaks of Foot-and-Mouth disease were confirmed in the South Wales infected area on January 3, and in the Wiltshire infected area on January 17. On January 11, an outbreak was confirmed at Adderbury, Banbury, Oxfordshire, in a previously free area. An Order was issued imposing the usual restrictions over an area of approximately 15 miles round the infected premises in Oxfordshire.

WIRELESS TALKS TO FARMERS, FEBRUARY, 1936

Station	Date	Time: p.m.	Speaker	Subject
National	5, 12, 19, 25	7.5	Prof. J. A. Scott Watson and others	For Farmers only.
Midland	4	6.30	Mr. Graham Castle	Country Correspondent: Gloucestershire.
	6	6.30	Mr. W. B. Thompson	For Midland Farmers.
	17	7.55	Mr. J. W. Robertson Scott	Country Correspondent: Cotswolds
	20	6.30	Mr. W. B. Thompson and Prof. J. A. Hanley	Grassland Management.
	21	8.0	Not yet fixed*	That land settlement offers a solution to the problem of unemployment
West ..	4	6.30	A squire, a school-master and two farmers	Village Opinion: (1) On contemporary problems.
	6	8.0	Messrs. John Redcliffe and A. W. Ling	Farmers' Tales: (1) A visit to Long Ashton Research Station.
	13	6.30	Mr. A. W. Ling and an auctioneer	For Western Farmers: a discussion—Twenty years of farming
	21	9.30	Various speakers	Village Opinion: (2).
	27	6.30	Mr. A. W. Ling	For Western Farmers.
North ..	7	6.30	Mr. F. R. Huxtable	Yorkshire broad-acres.
	20	6.30	Mr. W. B. Thompson and Prof. J. A. Hanley	Grassland management.
Welsh ..	1	6.45	Mr R. A. Roberts	The break in the cloud.
Scottish	7	6.30	Mr. J. F. Duncan	For Scottish Farmers.
	13	9.0	Mr. T. P. McIntosh	Potato crops in dry summers
	20	6.30	Mr. William J. Wright	For Scottish Farmers.
	27	6.30	Mr. W. M. Findlay	Grass seed mixtures.

* See the *Radio Times* for the relative week.

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APPOINTMENTS

ENGLAND

- Kent.**—Mr C. R. Thompson has been appointed Assistant Advisory Officer in Commercial Fruit Growing.
- Lancashire.**—Mr. R. Burgess, M.Sc., Ph.D., F.L.S., has been appointed Dairy Bacteriologist, *vice* Mr. G. F. V. Morgan, N.D.A., N.D.D.
- Middlesex.**—Mr. J. Hardy, N.D.H., has been appointed Assistant Horticultural Instructor, *vice* Miss M. Mason, B.Sc. (Hort.).
- Northumberland.**—Mr. A. Murchie, B.Sc. (Agric.), N.D.A., N.D.D., has been appointed Organizer of Agricultural Education, *vice* Mr. A. R. Wannop, B.Eng., B.Sc. (Agric.).
- Oxfordshire.**—Miss J. M. Brown, N.D.D., has been appointed Assistant Instructor in Dairying and Poultry Keeping, *vice* Miss M. Purcell, N.D.D., N.D.P.
- Shropshire.**—Mr. W. A. Scriven, N.D.A., N.D.D., has been appointed Junior Agricultural Instructor.
- Sussex, East.**—Mr. W. S. Gibson, B.Sc., has been appointed Deputy Director of Agriculture and Vice-principal of the School of Agriculture.
Mr. J. H. Hudson, B.Sc. (Hort.), has been appointed Assistant Horticultural Instructor.

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Insect Pests of Glasshouse Crops. By Herbert W. Miles and Mary Miles. Pp 174, 86 figs. in 21 plates, 15 text figs (Hook, Surrey: H. C. Long, "The Birkins," Orchard Road. 1935. Price 8s 6d By post 9s.)

The urgent need of an authoritative treatise on the pests of glasshouse plants has been realized by the amateur grower who takes a particularly keen interest in his greenhouse or conservatory, and by the commercial grower with his methods of intensive cultivation of vegetable and flower crops, both of whom are victims of a great variety of insect and allied pests of plants under glass. The dearth in treatises on pests of horticultural plants is to be deplored, and the authors have fully justified their hopes that they have given growers an account of pests such as occur in glasshouses, and of the measures that are applicable for controlling such pests under the special conditions of glasshouse horticulture.

The book is divided into nine chapters, seven of which (chapters II–VIII) are devoted to a study of the principal insect pests and such allied animals as Eelworms, Woodlice, Slugs, Millepedes and Spider Mites. The type of injury committed by each pest on various plants is described not only in the text but in an appendix—in which occurs an alphabetical list of the chief glasshouse crops together with the pests associated with each plant. The authors have fully appreciated the importance of this form of presentation, which is a particularly attractive one to the average grower who is unfamiliar with the various types of organisms that attack his plants, though the most unobservant among growers is soon aware of the fact that some destructive agent is present on his plants, by the effect of their feeding. A study of Appendix I will enable the grower to ascertain with comparative ease the culprit concerned and, later, to read an account of the biology and habits of the parasite in the text.

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Chapter I deals with "Glasshouse Conditions in Relation to the Occurrence and Control of Pests." It is appreciated by the intelligent grower that plant hygiene is the essence of prevention, and the authors have stressed the importance of maintaining the health of plants by paying due regard to the principles of clean cultivation.

The final chapter (Chapter IX) is devoted to a study of the methods of controlling pests in glasshouses. Such measures as the steam and chemical sterilization of soil, the fumigation of glasshouses, the effect of humidity in relation to fumigation, and the several insecticides for use on glasshouse plants, are dealt with in a concise and attractive manner.

Appendix II is a selected bibliography arranged under sectional headings, e.g., Aphides, Capsids, Caterpillars, Mealy Bugs and Scale Insects, Millepedes, Woodlice, Spider Mites, Virus Diseases, Weed Suppression, Insecticides, and some others.

In a book of this size it may appear to some that the authors have been prodigal in devoting thirteen pages to the Index, but they have set an example that may well be followed by other authors of text-books.

All the photographic illustrations, which, with two exceptions, were specially taken by the authors for use in this book, are excellent, illustrating as they do the several pests and the types of injury. Some of the text-figures are, on the other hand, less attractive.

The list of injurious species is inevitably incomplete, but the omissions, both of pests and of general information, are so few that it may be stated that this book will rank for some years as a standard work on the subject of glasshouse pests.

The proof-reading has been carried out with care and there seems to be few errors, and of these the more important are *Chorizema* for *Chorizema* (p. 51), *Irisine* for *Iresine* (p. 81), *Lecanium persicae* for *L. corni* (pp. 91, 156), and Plate XVIII, figs. 72 and 74, which should be transposed.

The authors are to be congratulated on the production of an attractive and authoritative text-book on a subject of ever-increasing importance to the horticultural profession. This volume is one that not only growers of glasshouse plants but all practical and scientific horticulturists will desire to have at hand as a reference book at a price which is particularly reasonable considering the useful and practical information contained therein.

Race, Sex and Environment. By J. R. de la H. Marett. Pp. 342 and 13 diagrams. (London: Hutchinson's Scientific and Technical Publications. 1935. Price 21s.)

As the sub-title states, this is a study of mineral deficiency in human evolution. The book is an attempt to synthesize something in the way of a general concept from recent research work in many branches of science, and particularly of agricultural science. Bringing together the Russian idea of the classification of soils as determined by climate, with Orr's work on the effects of mineral deficiencies in soils, on the vegetation, and on the diet of animals, and evoking something of Fisher's theory of dominance, together with Crew's theories of sex, the author evolves theories to account for the evolution of man. As he himself states, many of these theories require verification, but, at any rate, they form a basis for further discussion. He assumes that the different (mineral) classes of habitat have encouraged the survival of different genes, and that a gene is deemed only to exert its full outward effect on the body if and when its own intra-nuclear environment is similar to that prevailing at the time of its selection as a new mutant. A somewhat startling conclusion is that mineral deficiency

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(iodine and calcium shortage) made man out of an ape. In support of the theories he draws largely on findings in domestic animals, such as those of the Dexter bulldog calf. The fineness of bone and the femininity of Jersey cattle in their native island, he attributes to the deficiency of calcium and to the prevalence of iodine, respectively, in the soil of the island, for they lose something of these characters when removed elsewhere.

The theory that bodily characters can be altered by environment in no way invalidates the conception of race as primarily an affair of heredity, but it does call for a considerable modification of the present view.

While the main purpose of the book is to marshal the facts that bear on human evolution, there is much in it to interest agriculturists. For example, as Marett views it, the general effect of the opening up of the New World for wheat growing has been to increase consumption of animal products (meat and milk), and this has reacted favourably upon the anatomical development of the race by increasing stature.

Plant Physiology. By Meirion Thomas, M.A. Pp. xii + 494. (London: J. & A. Churchill Ltd. 1935. Price 15s.)

Present-day knowledge of plant processes covers such a wide field that no adequate discussion of it can be made within the limits of a small text-book. The author of the work under review has tried to avoid this difficulty by restricting his attention mainly to some of the major physiological processes of plants that can be treated from the point of view of the biochemist. The book is intended for the use of students and others already possessing an elementary knowledge of plant physiology and organic chemistry.

The subject-matter is arranged in four parts dealing with Protoplasm, with Absorption, Translocation and related processes, Nutrition and Metabolism, and with Growth and Movement. Two large appendices together make up about one-fifth of the volume. Much space might have been set free for physiological discussion had the author omitted the appendix on plant chemistry and been content with the references to standard works given in the carefully selected bibliography. The treatment is clear and interesting, but the amount of detail given varies much, depending on the extent of biochemical research into the different activities of plants. There are good accounts of recent work on the relation of auxins to growth, on respiration and on the conduction of solutes in plants, though mention of Curtis's work is omitted from the bibliography. The book should prove a useful addition to the literature of plant physiology.

Land and Unemployment. By James F. Muirhead, M.A., L.H.D. Pp. xix + 211. (London: Humphrey Milford, Oxford University Press. Price 7s. 6d.)

In view of the considerable number of books and pamphlets that have appeared recently on the question of Land Settlement in relation to unemployment, it should be noted that this volume by Dr. Muirhead does not specifically treat of those questions. Rather is it a study from a new viewpoint of Henry George's proposals for a "single tax." Dr. Muirhead feels that it is unfortunate that Henry George's disciples in this country are so closely associated with the "left," as the proposals put forward by Henry George with regard to the taxation of land values may not be inconsistent with the views of all parties in "the furtherance of the best features of their policies." Dr. Muirhead is of opinion that those who believe that a revival of agriculture is essential can rest assured that the taxation of land values can be nothing other than helpful to all reasonable measures to attain that end.

SELECTED CONTENTS OF PERIODICALS

Practical Goat-keeping. By B. S. P. Abbey. Pp. 114 and 8 figs. (London: Cassell & Co. Ltd. 1935. Price 1s. 6d.)

This useful manual fully justifies its title, embodying as it does the experience of one of the best-known British goat-breeders, whose animals have been constant prize-winners for many years. In the preface Mrs. Abbey utters a necessary caveat against the popular fallacy that goats will prosper and be profitable on a diet of "next to nothing"; at the same time claiming that no other animal belonging to the category of "householder's stock" gives greater rewards in return for reasonable and considerate treatment. The opening chapter describes the breeds to which sections are allotted in the British Goat Society's Herd Book, and subsequent chapters deal with housing, selection, general management, goatlings, breeding, kidding, kid-rearing, disbudding, feeding and foods, showing and shows, the male, ailments and nursing. The book may be confidently commended to all who require practical instruction on the care and management of goats.

Farmhouse Fare: A Cookery Book of Country Dishes. Pp. 160 (London: The Farmers Weekly Ltd. 1936. Price 1s.)

This is a comprehensive and well-arranged cookery book, with varied and useful recipes under the headings:—Soups, Meat, Fish, Poultry, Game, Puddings and Pies, Savouries and Supper Dishes, Bread and Cakes, Preserves, Wines, Pickles, Candies and Christmas Fare. Each section is prefaced by brief but practical hints relating to preparation and treatment of material, and usefulness of the various commodities in the dietary. The book has a special character, for the recipes have been collected from country housewives by *The Farmers Weekly*, and a number of unusual dishes (e.g., Oat Soup, Vinegar Cake, Plank Bread) consequently figure in the list. Ways of dealing with rabbits, game and other foods easily obtainable by the farmer's wife are a feature of the book. The publication is good value for a shilling, containing as it does useful miscellaneous information, including some home-made remedies for minor ailments.

Agricultural Holdings and Tenant Right: being a treatise on the Law of Agricultural Holdings. By Clement E. Davies, M.P. Third Edition. With Chapters on "The Practice of Tenant Right Valuation," by N. E. Mustoe, M.A., LL.B., and "Customs of the Country," by J. E. Tory, O.B.E., F.S.I. Pp. 503. (London: The Estates Gazette Ltd. 1935. Price 15s.)

Since the last edition of this treatise, the Agricultural Holdings Act of 1923 has been placed on the Statute Book, and the new edition has been revised accordingly, with particular reference to recent decisions in the Courts. The book will go far to supply the need on the part of owners, tenants, agents and students for a readable guide to this important subject. The two additional chapters on the practice of tenant right valuation and the assessment of claims, and the chapter on arbitration, should prove especially useful.

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Agriculture, General and Miscellaneous

A Note on the Influence of Rainfall on the Yield of Cereals in Relation to Manurial Treatment. *W. G. Cochran.* (Jour. Agric. Sci. 25, 4 (Oct., 1935), pp. 510-522.)

SELECTED CONTENTS OF PERIODICALS

- An Examination of Methods for Determining Organic Carbon and Nitrogen in Soils. *A. Walkley*. (Jour. Agric. Sci., 25, 4 (Oct., 1935), pp. 598-609)
- Cultivations. *H. G. Sanders* (Jour. Fmrs.' Cl, Lond., Pt 5 (Nov., 1935), pp. 81-100.)
- The Land Drainage Act, 1930, as it Affects the Rights and Liabilities of Landowners. *J. R. Smith-Saville*. (Jour. Land Agents' Soc, 34, 11 (Nov., 1935), pp. 620-634.)
- Assarting and the Growth of the Open Fields. *T. A. M. Bishop*. (Econ Hist. Rev, 6, 1 (Oct., 1935), pp. 13-29.)
- Estate Management as Affected by Recent Agricultural Depression. (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 309-317.)
- Some Aspects of the Problem of the Industrial Worker on the Land. *H. Krause*. (Int. Lab Rev, 32, 6 (Dec., 1935), pp. 780-791.)
- Agricultural Co-operation in Sweden *H. Lindstedt*. (Int. Rev. Agric. Mon. Bull. Agric. Econ. Soc., 26, 9 (Sept., 1935), pp. 331-339, 26, 10 (Oct., 1935), pp. 360-369 and 26, 11 (Nov., 1935), pp. 402-417)
- Botanic Gardens. Origin, History and Development. *J. W. Besant*. (Jour. I.F.S. Dept Agric., 33, 2 (1935), pp. 173-182, 5 pl., 1 plan)
- A Great Agricultural Improver--Lord Kames. *A. McCallum*. (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 334-342)
- La production de la laine artificielle en Italie et ses repercussions sur l'industrie laitière *H. Girard et G. Ray*. (C. R. Acad. Agric. Fr., 21, 30 (4 Dec., 1935), pp. 1148-1154.)
- The Composition of Crude Fibre. *A. G. Norman*. (Jour. Agric. Sci., 25, 4 (Oct., 1935), pp. 529-540)
- The Waste Products of Horticulture: Their Utilization as Humus. *A. Howard*. (Sci. Hort., 3 (1935), pp. 213-214.)
- The Manufacture of Humus by the Indore Process. *A. Howard*. (Jour. Roy. Soc. Arts, 84, 4331 (22 Nov., 1935), pp. 26-59.)
- Studies on European Foul Brood of Bees. *H. L. A. Tarr*. (Ann. Appl. Biol., 22, 4 (Nov., 1935), pp. 709-718, 1 pl.)
- Observations on the Sheep Blowfly (*Lucilia Sericata* Meig.) in Scotland. *F. N. Ratchiffe* (Ann. Appl. Biol., 22, 4 (Nov., 1935), pp. 742-753.)

Agricultural Economics

- The Financial and Economic Results of State Control in Agriculture. *J. A. Venn*. (Econ. Jour., 45, 180 (Dec., 1935), pp. 649-662.)
- A Comparison of the Financial Returns of Owner-Occupier and Tenant Farmers. *P. E. Graves* (Farm Econ., 1, 12 (Oct., 1935), pp. 246-247.)
- Some Factors Influencing the Cost of Milk Production. *F. R. G. N. Sherrard*. (Farm Econ., 1, 12 (Oct., 1935), pp. 244-245.)
- Cost of Improving Cowsheds for Certified and Grade A (T. T.) Milk. *R. N. Dixey*. (Farm Econ., 1, 12 (Oct., 1935), pp. 233-238.)
- The Labour Bill and Output on Arable Farms. *R. McG. Carslaw and P. E. Graves* (Jour. Roy. Stat. Soc., 98, 4 (1935), pp. 601-637.)

Plant Pests, Diseases, etc.

- Fruit Pests: their Effects and Detection. *G. F. Wilson*. (Jour. Roy. Hort. Soc., 60, 12 (Dec., 1935), pp. 536-544, 8 pl.)

SELECTED CONTENTS OF PERIODICALS

- A New Virus Disease of the Tomato. *K. M. Smith.* (Ann. Appl. Biol., 22, 4 (Nov. 1935), pp. 731-741, 3 pl.)
- New Virus Diseases of the Tomato. *K. M. Smith.* (Jour. Roy. Hort. Soc., 60, 10 (Oct., 1935), pp. 448-451.)
- Further Serological Studies of Plant Viruses. *J. M. Birkeland.* (Ann. Appl. Biol., 22, 4 (Nov., 1935), pp. 719-727.)
- Stripe Disease of Daffodils. *N. K. Gould.* (Jour. Roy. Hort. Soc., 60, 11 (Nov., 1935), pp. 492-500.)
- On the Botrytis Disease of Lettuce, with Special Reference to its Control. *W. Brown.* (Jour. Pomol., 13, 3 (Oct., 1935), pp. 247-259.)
- The Lily Thrips (*Liothrips Vaneeckei*, Priesner). *W. E. H. Hodson.* (Bull. ent. Res., 26, 4 (Dec., 1935), pp. 469-474, 1 pl.)
- Control of Insect Pests of Bulbs: A Survey of Recent Work. *W. E. H. Hodson.* (Sci. Hort., 3 (1935), pp. 192-196.)
- Diseases of Narcissi and Tulips. *A. Beaumont.* (Sci. Hort., 3 (1935), pp. 184-191.)
- Observations sur les produits utilisés en 1935 dans la lutte contre le Doryphore. *A. Demolon et M. Raucourt.* (C. R. Acad. Agric. Fr., 21, 29 (27 Nov., 1935), pp. 1111-1119.)
- Variabilité de l'attaque du Doryphore sur diverses solanées tubérifères. *P. Marchal et al.* (C. R. Acad. Agric. Fr., 21, 31 (11 Dec., 1935), pp. 1169-1175.)
- Nouvelles expériences sur le traitement des pommiers et des pomiers contre la tavelure et la Carpocapse. *A. Paullot.* (C. R. Acad. Agric. Fr., 21, 29 (27 Nov. 1935), pp. 1108-1111.)
- Seed Disinfection:—I. An Outline of an Investigation on Disinfectant Dusts Containing Mercury. *W. A. R. Dillon-Weston and J. R. Boover.* (Jour. Agric. Sci., 25, 4 (Oct., 1935), pp. 628-649, 1 pl.)
- Raan or Boron Deficiency in Swedes. *D. G. O'Brien and R. W. G. Dennis.* (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 326-334, 3 pl.)

Field Crops, etc.

- The Chemistry of Grass Crops. *A. I. Virtanen.* (Jour. Soc. Chem. Ind., Lond., 54, 47 (22 Nov., 1935), pp. 1015-1020.)
- The Estimation of the Efficiency of Sampling, with Special Reference to Sampling for Yield in Cereal Experiments. *F. Yates and I. Zaccopanay.* (Jour. Agric. Sci., 25, 4 (Oct. 1935), pp. 545-577.)
- Wheat Prices and the Acreage of Wheat in Great Britain. *K. A. H. Murray and Ruth L. Cohen.* (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 354-363.)
- The Differentiation of Grain Samples of Closely Related Varieties of Wheat by Means of a Simple Mechanical Test for Grain Quality. *O. H. Frankel.* (Jour. Agric. Sci., 25, 4 (Oct., 1935), pp. 461-465.)
- World Wheat Prices, Canadian-Argentine Spreads, and the Ottawa Agreement. *A. E. Taylor.* (Wheat Stud., Stanford Univ., 12, 2 (Oct., 1935), pp. 35-56.)
- The Mechanization of Agriculture and Wheat Growing throughout the World. *H. J. Hopfen.* (Int. Rev. Agric. Mon. Bull. Agric. Sci. Pract., 26, 11 (Nov., 1935), pp. 493-512.)
- Japanese Self-sufficiency in Wheat. *C. L. Alsberg.* (Wheat Stud., Stanford Univ., 12, 3 (Nov., 1935), pp. 57-96, Appendix Tables.)

SELECTED CONTENTS OF PERIODICALS

- Some Effects of Lime on Ryegrass. *A. F. R. Nisbet.* (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 349-353.)
 Basket Willow Growing in Somerset: A Depressed Industry. *C. V. Dawe and J. E. Blundell.* (Farm Econ., 1, 12 (Oct., 1935), pp. 240-242.)

Horticulture

- Commercial Horticulture in Northern Ireland. *W. J. Megaw and E. E. Skullman.* (Sci. Hort., 3 (1935), pp. 13-23.)
 Science and Fruit Growing. *T. Wallace.* (Sci. Hort., 3 (1935), pp. 6-12.)
 Twenty-one Years' Fruit Research at East Malling. *R. T. Pearl and R. Hart.* (Sci. Hort., 3 (1935), pp. 55-64 and 209-212.)
 Fruit Tree Spraying Equipment. *J. Turnbull.* (Sci. Hort., 3 (1935), pp. 24-32.)
 Selection of Soils for Dessert Apple Growing. *B. S. Furneaux.* (Sci. Hort., 3 (1935), pp. 42-54.)
 Recent Developments in Walnut Growing in England. *Joyce B. Hamond.* (Jour. Roy. Hort. Soc., 60, 11 (Nov., 1935), pp. 501-507.)
 Modern Methods of Vegetable Production and Marketing. *F. A. Secrett.* (Jour. Roy. Soc. Arts, 84, 4334 (Dec., 1935), pp. 126-153.)
 The Vegetable Industry To-day. Home Supplies and Imports. *H. V. Taylor.* (Sci. Hort., 3 (1935), pp. 67-76.)
 Vegetables in Relation to the Canner. *F. Hirst.* (Sci. Hort., 3 (1935), pp. 109-118.)
 Machinery in Vegetable Production. *S. J. Wright.* (Sci. Hort., 3 (1935), pp. 97-108.)
 Irrigation of Vegetable Crops. *F. A. Secrett.* (Sci. Hort., 3 (1935), pp. 82-96.)
 The Manurial Problem in Relation to Vegetable Production. *A. H. Hoar.* (Sci. Hort., 3 (1935), pp. 77-81.)
 Storage of Vegetable Seeds. *Lela V. Barton.* (Contr. Boyce Thompson Inst., 7, 3 (July-Sept., 1935), pp. 323-332.)
 Points in the Cultivation of Tomatoes, Cucumbers and Lettuces in Glasshouses. *W. Corbett.* (Sci. Hort., 3 (1935), pp. 133-141.)
 The Heating of Commercial Glasshouses. *C. E. Hudson.* (Sci. Hort., 3 (1935), pp. 142-147.)
 The Improvement of Glasshouse Soils. *W. Corbett.* (Sci. Hort., 3 (1935), pp. 148-152.)
 Orchard-Heating Experiment at Wisley (May, 1935). *A. N. Rawes.* (Jour. Roy. Hort. Soc., 60, 11 (Nov., 1935), pp. 508-509.)
 Some Observations on the Manuring of Bulbs. *G. W. Gibson.* (Sci. Hort., 3 (1935), pp. 174-183.)
 Some Factors in Commercial Bulb Production. *J. C. Wallace and D. E. Horton.* (Sci. Hort., 3 (1935), pp. 167-173.)
 Commercial Aspects of the Bulb Industry. *W. H. Waldeck.* (Sci. Hort., 3 (1935), pp. 153-166.)

Live Stock and Feeding

- Meat Imports and the Livestock Industry in the United Kingdom. *C. Hubback and J. K. Montgomery.* (Int. Rev. Agric. Mon. Bull. Agric. Econ. Soc., 26, 10 (Oct., 1935), pp. 353-360 and 26, 11 (Nov., 1935), pp. 389-402.)
 The International Situation and Problems of Horse-Breeding.

SELECTED CONTENTS OF PERIODICALS

- Part I. Survey of the Development of Horse-Breeding throughout the World. *E. Moskovits*. (Int. Rev. Agric. Mon. Bull. Agric. Sci. Pract., 26, 8 (Aug., 1935), pp. 353-392 and 26, 10 (Oct., 1935), pp. 461-490.)
- Attempted Improvement of the Blackface Sheep in Zetland. *I. E. Sandison*. (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 342-348.)
- The Pig Cycle: A Reply. *Ruth Cohen* and *J. D. Barker*. (Economica, 2 (New Series), 8 (Nov., 1935), pp. 408-422.)
- The Pig Cycle: A Rejoinder. *R. H. Coase* and *R. F. Fowler*. (Economica, 2 (New Series), 8 (Nov., 1935), pp. 423-428.)
- The Development of the Wax-Plucking Method for Poultry. *N. H. Grace*. (Sci. Agric., 16, 2 (Oct., 1935), pp. 67-72.)
- Recent Pig-Feeding Experiments. *A. H. Blissell*. (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 317-326.)
- The Food Value of Oat Hulls. *E. J. Sheehy*. (Jour. I. F. S. Dept. Agric., 33, 2 (1935), pp. 167-172.)
- Experiments on Grass Silage. *C. Boyle* and *J. J. Ryan*. (Jour. I. F. S. Dept. Agric., 33, 2 (1935), pp. 149-159.)
- Recording of Home-Grown Bulky Foods. *A. L. Jolly*. (Farm Econ., 1, 12 (Oct., 1935), pp. 248-250.)

Dairying, etc.

- The Story of the Jersey Cow. *J. R. de la H. Marcell*. (Estate Mag., 35, 11 (Nov., 1935), pp. 838-842.)
- The Rate of Milking by Machine. *A. S. Foot*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 313-319.)
- Milking Machines in Scotland. *A. C. McCandlish* and *J. P. Struthers*. (Scot. Jour. Agric., 18, 4 (Oct., 1935), pp. 363-366.)
- Feeding Butterfat to Dairy Cows. *A. C. McCandlish* and *J. P. Struthers*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 303-306.)
- The Nutritive Value of Proteins for Maintenance. *S. Morris* and *N. C. Wright*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 289-302.)
- The Yield and Composition of the Milk of the Ewe. *W. Godden* and *C. A. Puddy*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 307-312.)
- The Influence of High Environmental Temperature on the Secretion and Composition of Milk. A Preliminary Note. *S. Bartlett*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 283-288.)
- Factors Affecting Milk and Butterfat Secretion:—I. Variations in Fat Weight, Fat Percentage and the Amount of Fat in the Milk required to make a Given Weight of Butter. *Elizabeth O. Whetham* and *J. Hammond*. (Jour. Dairy Res., 6, 3 (Sept. 1935), pp. 320-339.)
- Factors Affecting Milk and Butterfat Secretion:—II. The Colour of the Butterfat. *Elizabeth O. Whetham* and *J. Hammond*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 340-352.)
- An Unusual Variation in the Butterfat Content of Milk. *K. Hartley* and *D. W. H. Baker*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 353-362.)
- Mastitis Streptococci in Bulk Milk. *E. J. Pullinger*. (Jour. Dairy Res., 6, 3 (Sept. 1935), pp. 367-382.)
- The Function of Pepsin and Rennet in the Ripening of Cheddar Cheese. *I. R. Sherwood*. (Jour. Dairy Res., 6, 3 (Sept., 1935), pp. 407-421.)

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NOTES FOR THE MONTH

Warble Fly (Dressing of Cattle) Order of 1936

EVERY farmer is familiar with the barrel-shaped maggots that are often to be found in large numbers, from January until May, just under the skin on the backs of cattle. These maggots are the grubs of the warble fly. When present in large numbers they are the cause of enormous loss to farmers, much greater than is commonly realized. At a low estimate, the annual loss in damaged hides alone is put at upwards of £500,000; but this is not the only damage they do. The butcher often finds the flesh beneath the "warbled" areas so altered by the inflammation set up that the meat is useless for human food: this inflamed condition of the beef is termed "licked."

Although the maggots are the chief culprits, the adult flies are by no means free from blame. When flying round on the look out for a suitable place to lay their eggs, they frighten the cattle, which rush about the field with their tails in the air. This "gadding" often causes the animals to lose condition and decreases the yield of milk in cows.

Appeals have been made in the past to cattle owners in their own interests to destroy as many warble fly maggots as they possibly can and to persuade neighbouring farmers to do the same; but although voluntary methods have met with a certain local measure of success, complete freedom from the pest has not been achieved in any area, owing doubtless to lack of complete co-operation and also, in some measure, to the reintroduction of the parasite with cattle from elsewhere.

Following representations from Local Authorities,

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agricultural bodies and industrial associations on the urgent necessity of introducing compulsory measures against the ox warble fly, the Ministry has now issued the Warble Fly (Dressing of Cattle) Order of 1936. The Governments of Northern Ireland and the Irish Free State have adopted similar measures in their countries. These provide safeguards against the risk of reinfestation in Great Britain by cattle imported from Ireland.

The Warble Fly (Dressing of Cattle) Order of 1936 applicable to Great Britain requires all visibly-infested cattle to be treated by one of the following methods :—

Either (1) the infested cattle shall be treated with a dressing, which shall be prepared immediately before use, by diluting with water a preparation in powder form containing powdered derris root. The directions for diluting the preparation shall be such that each gallon of dressing shall contain—

(a) either $1\frac{1}{2}$ oz. of derris resins or $\frac{1}{2}$ oz. of rotenone; and

(b) 4 oz. of soap, which may be added at the time of dilution or may be incorporated in the preparation in powder form.

This dressing must commence in each year between March 15 and 22, or as soon after as the maggots appear under the skin on the backs of the cattle, and must be repeated at intervals of not less than 27 days nor more than 32 days as long as the maggots continue so to appear. The dressing must be applied to the skin so that it shall come in contact with the larvæ through the breathing holes made by them in the skin.

Or (2) Alternatively, mechanical means shall be employed to remove and effectively destroy all ripe maggots from the backs of infested cattle at such intervals— not exceeding ten days—as may be necessary to prevent the escape of live maggots.

Treatment by either of the two methods above described will not be required after June 30 in any calendar year.

The receptacle containing a preparation advertised as being suitable for preparing a dressing to comply with the above-mentioned Order is required by the Order to be labelled before being sold or offered for sale, with a statement giving full directions for dilution and use and certifying that the dressing prepared as directed complies with the Order. Farmers, therefore, will experience no difficulty in obtaining an effective preparation.

Copies of a leaflet containing full information as to the life-cycle of the warble fly, and of the requirements of the Order may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 7, Whitehall Place, London, S.W.1.

Sugar-beet Seed

THE following note has been communicated by the National Institute of Agricultural Botany :—

The Institute has now conducted field trials with strains of sugar-beet over a period of eleven years. These trials, which have been situated in the most important beet-growing districts of England, show that certain strains are definitely superior to others on the basis of sugar yields, and further, that some strains are more suitable than others for special circumstances such as early sowing or for very rich soils. Every grower should therefore give careful attention to the selection of strains, and advantage should be taken of the wide choice of seed offered by factories.

Of the three main types of seed, the “ E ” or heavy-yielding type and the “ N ” or normal type are usually the most profitable to grow. Of these two types, the following strains have given high sugar yields and can be recommended for general cultivation :—Kleinwanzleben E, Kleinwanzleben N, Marsters, Johnson’s Perfection, Kuhn P, Dippe E, Dobrovice N, Hoerning H.S., Zapotil N, Strube E and Danish 31-IV.

For early sowings, non-bolting strains have a special value. Marsters has proved almost completely resistant to bolting, and Kuhn P is almost as good. Johnson’s Perfection, Kleinwanzleben E and Kleinwanzleben N also have been usually fairly free from bolters, even when sown early. For districts where conditions are usually very favourable to bolting, the Institute recommends Marsters or Kuhn P for the earliest sowings.

For early lifting, any of the strains mentioned in the preceding paragraph will do well when sown early. Although the best “ E ” strains give good sugar yields when lifted early, they are more suitable for late lifting; their greater vigour and continued late growth lead to a still higher sugar yield when lifting is deferred until, say, the middle of November.

Large-topped strains are apt to be troublesome on very rich soils. In recent trials in the fens, Marsters,

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which has the smallest tops, and Kleinwanzleben E (apart from its large top) gave the best results, followed by Kleinwanzleben Z, Kleinwanzleben N, Johnson's Perfection, and Kuhn P. The last two have larger tops than Marsters but smaller ones than the Kleinwanzleben strains.

All the above strains are originally of Continental origin, and most of the seed used here is grown abroad. Trials have, however, shown that English once-grown seed of the above-mentioned Continental strains gives just as good results as foreign-grown seed, provided it is properly grown and harvested under good conditions. Full particulars of the leading strains are given in a leaflet which may be had free of charge from County Agricultural Organizers or direct from the Institute, Huntingdon Road, Cambridge.

The Interpretation of Tractor Test Results

THE following note has been contributed by Mr. S. J. Wright, M.A., of the Institute for Research in Agricultural Engineering, University of Oxford :

In testing a tractor it is customary to carry out both belt tests and drawbar tests. The results of belt tests are of relatively little direct interest to farmers, for, in general, tractors are used for belt work only as a matter of convenience and not with the object of giving a highly-efficient performance. The tests indicate the rated or normal working belt horse-power that the tractor can maintain, and the maximum belt horse-power that is available temporarily when circumstances demand it. From previous experience, or from information supplied by the makers of the machine that it is proposed to drive, the farmer can decide on the basis of the test figures whether a given tractor has sufficient power for his purpose.

Two other items that are usually given in reports of belt tests, and may be of direct interest to farmers, are the efficiency of the governor control and the fuel consumption at fractional loads. An efficient governor is necessary, particularly in threshing and grinding; while, since tractors must often work, both on the belt and on the drawbar, with loads less than their full rated load, it is advisable to make sure that the fuel

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consumption per horse-power hour does not rise unduly when the load is reduced. A comparison of the belt fuel consumption at rated load, three-quarters rated load, and so on, will provide this information.

The most important information given by a drawbar test is the rated horse-power and the relation that it bears to the maximum horse-power. The rated drawbar horse-power gives a measure of the rate at which the tractor will work in the field. As a rough guide, a tractor with a drawbar rating of 20 h.p. can be expected to plough an acre an hour at 5 to 6 in. depth on medium land. The full rate of working on any job, however, can only be attained if the implement is big enough to demand the full rated power of the tractor when running at normal speed in the particular gear used. If a full-sized implement is to be used without waste of time due to accidental stoppages, it is necessary that the tractor (in its normal running condition) should have a reserve of power available over and above its rated power. This is because there will always be difficult patches in any field where the land is "stronger" than the average, and because starting off from a standstill with a full load requires extra power. To provide an ample margin for these and other contingencies, the rated drawbar horse-power should not exceed 75 per cent. of the maximum drawbar horse-power developed under test.

This, however, is not the whole story, for two tractors may give the same horse-power and yet be entirely different when the drawbar pull and speed are considered separately. The available drawbar pull alone decides the size of implement that can be used. It is difficult to give definite figures, for the draught of a given plough may vary in different soils from 5 lb. to 15 lb. per sq. in. of furrow section. On the basis of the example already given, however, a drawbar pull of 650 lb. might be required on medium land for a furrow of 12 in. $\times$ 6 in. section. Suppose, then, that the test figures for a particular tractor show that it developed 16 drawbar horse-power in its maximum load tests by giving a pull of 3,000 lb. at 2 m.p.h. in bottom gear, and of 2,000 lb. at 3 m.p.h. in middle gear. On the basis of a 75 per cent. rating,

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the rated horse-power would be 12 and the corresponding pulls would be 2,250 lb. in bottom gear and 1,500 lb. in middle gear. On the medium land, assumed above, and with the furrow sizes given, the tractor would pull a three-furrow plough (1,950 lb.) in bottom gear or a two-furrow plough (1,300 lb.) in middle gear. Since, however, the full rated load would not be required by either of these ploughs, an economy might be effected by widening the furrows somewhat so as to increase the load.

For some work, special attention to the speeds available in the different gears is also necessary. For transport, a high speed is desirable: for some other purposes, such as hoeing, or combine harvesting in a heavy crop, a low speed may be an advantage. It should be realized that whenever the tractor is used at a speed lower than the normal bottom gear speed, it will not develop its full power. Sometimes, through failure to realize this, a tractor with unsuitable gear ratios is chosen and power and fuel are wasted, since it is constantly used with loads less than those for which it was designed.

The Use of Electricity in Agriculture.

THE following note on the recent Rothamsted Conference on the Use of Electricity in Agriculture has been contributed by Mr. H. V. Garner, M.A., B.Sc., of the Rothamsted Experimental Station:—

The choice of this subject for the Conference held at Rothamsted on January 29 was particularly suitable, for electricity on farms is no longer regarded as an unattainable luxury or a rather doubtful novelty. In an increasing number of districts it is a matter of immediate practical interest, for there are already about 25,000 farms using electricity in this country, and of these 5,000 were connected last year.

Sir Bernard Greenwell, well known both in agriculture and in the electrical industry, was in the chair. The papers covered a wide field. "Electric Power—How to obtain it and how best to use it" was the subject of a practical and comprehensive paper by Mr. M. M. Harvey, who outlined developments in the area served by the Shropshire, Worcestershire and

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Staffordshire Electric Power Co. The results of the Rothamsted experiments on the comparison of electricity and oil for work in and about the farm buildings were set out by Dr. B. A. Keen and Mr. G. H. Cashen.

Mr. F. E. Rowland of the General Electric Co. followed with a valuable paper on "Electric Motors for Farm Machinery." Finally "Wiring and Earth Leakage" was discussed by Mr. C. A. Cameron Brown, of the Institute for Research in Agricultural Engineering, Oxford. The papers and discussion that followed are fully reported in No. XXI of the Rothamsted Conferences. In this short notice only a few of the many important points can be mentioned.

All speakers agreed that a great change in the attitude of farmers towards electricity had taken place in recent years. The convenience of electricity for lighting and its complete suitability for a large range of power purposes was unquestioned. Price was of course the controlling factor. Some authorities gave 2*d.* per unit as the price at which electricity could profitably be employed on farms, a figure much above that prevailing in the North Metropolitan Supply Area, for example, where farmers obtain electricity at a meter price of $\frac{1}{2}$ *d.* per unit if taken in the day time. The way to reduce costs was not so much by greater technical efficiency in the production of electricity, for the actual production accounted for less than one-quarter of the total charges. The aim should be to distribute overhead charges over a larger consumption, and especially to develop the agricultural load in the off-peak period. It was suggested that the use of electricity for field cultivation, and also for crop drying would help in this direction.

To bring electricity to the farm involves the Supply Company in a cost that is usually met by some form of standing charge in addition to the cost of the units consumed. These charges must naturally be taken into account in determining the final cost of electricity to the rural consumer. The more a farmer uses the cheaper is his cost per unit. When electricity has been installed it should therefore be used to the full. Companies were urged to tell their customers the exact cost incurred in bringing the supply to their farms,

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and to render the burden of the standing charge as light as possible.

In wiring the farm buildings the best plan was to discuss requirements in detail with a practical expert and place the work in the hands of a thoroughly reliable firm. It was most important to choose a layout that would be both convenient and lasting. When it was properly used electricity was perfectly safe on the farm, but, as with all other sources of light and power, reasonable precautions against accidents must be taken. Automatic safety devices for motors and other appliances were explained and demonstrated at the Conference.

In addition to its more obvious advantages the electric motor is very suited for farm purposes in other respects. Thus, though the efficiency of an oil engine declines when it is worked at low loads, the efficiency of a motor is very little affected. Consequently a motor may be used economically for a job much below its maximum output. Further, the motor will stand a temporary overload, and thus, like the farm horse, it can work above its ordinary capacity for short periods.

Many who are in doubt whether to change from the older forms of power to electricity could make a better decision if figures were available showing the comparative performance of each source of power under ordinary farm conditions. Tests of this kind are being conducted at Rothamsted, electric motors and oil engines being used in turn to drive the same machinery. Threshing and grinding have been studied so far, but extensive tests over a wide range of conditions will be required. Some preliminary results were quoted at the Conference. For threshing with a 20 H.P. motor, as compared with a 10-20 H.P. agricultural tractor, electricity was cheaper if the all-in cost did not exceed 1.87*d.* per unit. For grinding, using a 5 H.P. motor and a 6 H.P. Diesel engine, the cost of electricity should not exceed 1.36*d.* per unit if the work was to be done as cheaply by the motor as by the Diesel engine.

The tone of the meeting was optimistic, and gave an impression of confidence in the future of rural electrification.

The Use of Rubber in Agriculture

DURING recent years, there have been considerable developments in connexion with the employment of rubber for a variety of agricultural purposes. What may be called the star turn has doubtless been the introduction of pneumatic-tyred wheels for farm carts, wheelbarrows and, in particular, for farm tractors: at the recent Mechanization Conference at Oxford, special emphasis was laid on the value of ball-bearing pneumatic-tyred wheels in reducing draught. It is all to the good that the Rubber Growers' Association should have convened a conference on the use of rubber in agriculture, at which many sides of the question were discussed. The conference was held in London on January 27, Mr. James Fairbairn presiding, and Mr. Alexander Hay, N.D.A., N.D.D., gave an address outlining the many ways in which rubber is now used to lighten labour, and to introduce convenience and cleanliness in agricultural operations.

In his introductory remarks, Mr. Fairbairn said that during the past six months, Mr. Hay had been specially commissioned by the Rubber Growers' Association to visit a number of Agricultural Colleges and Farm Institutes in Great Britain and Ireland, and, with the willing co-operation of Principals and staffs of these institutions, he had delivered a series of lectures and talks on rubber. For the facilities accorded to Mr. Hay, in his mission, Mr. Fairbairn expressed his warm appreciation. Mr. Hay found that his lectures attracted considerable attention, and naturally he had to face searching inquiry on practical points.

Mr. Hay then gave a simple and interesting account of the subject, outlining the developments that have taken place during the past three years. An outstanding development of recent date was the use of pneumatic tyres, and there was no doubt that these tyres had proved their worth for both mechanical and horse transport. He urged the need for standardized types of carts in order that the benefits of the pneumatic tyre might be made available to agriculturists

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at reasonable prices. As regards cowshed and cow-stall flooring, rubber coverings, of which there were various types, enabled the farmer to eliminate risk of injury to his cattle by the provision of a relatively warm floor surface that prevented knee and hock wounds, and enabled him to effect a saving in upkeep costs by reducing the quantity of litter used.

Creameries and dairies provided another field for the use of rubber flooring of suitable quality. A development that would confer a boon on the general public was the use of rubber rims on milk churns, and he thought that dairy firms would earn public gratitude if they silenced the present noisy churn. Apart from this, self-interest might eventually dictate the use of the rubber rim, which, there was no doubt, prevented damage to the churn itself and materially reduced the damage to floors upon which churns were dropped or rolled. Mr. Hay also referred to the increasing use of rubber for horseshoes and horse-shoe pads, the use of rubber prong protectors to prevent damage in lifting potatoes, rubber-jointed tracks to prevent abrasion between links, with consequent longer wearing life, and various other applications of rubber for farming purposes.

At the conclusion of Mr. Hay's address, the Chairman observed that uses of rubber in agriculture concerned others besides the rubber manufacturers, and this fact should foster co-operative effort for mutual benefit. The manufacturers, with years of practical experience in the development of new markets, should come forward with constructive suggestions on co-operative lines. Some illuminating remarks of a prominent manufacturer in the United States of America had been recently reported in the Press. He said: "The rubber industry has just started to grow. Ahead is an almost untouched market. It is the furnishing of tyres for 24,000,000 farm vehicles. A start has already been made. Many tractors are already equipped with rubber tyres. The future will see more of them. Shod with rubber, tractors can be built of lighter material and at lower cost." This was an encouraging outlook, and provided much food for thought in connexion with the object of that meeting.

The Bacteriological Grading of Milk

THE draft Milk (Special Designations) Order, 1936, recently issued by the Ministry of Health, embodies a number of recommendations contained in a report* by Professor G. S. Wilson, issued by the Medical Research Council. This report is a comprehensive and critical survey of three years' investigation at the London School of Hygiene and Tropical Medicine, undertaken with the aid of public funds and with the advantage of consultation with a special Committee, which included representatives of Government Departments.

Attention is deliberately confined to the bacteriological methods available for determining the cleanliness and keeping quality of milk; no attempt is made to deal with the public health question of the safety of milk as shown by the absence of pathogenic organisms.

Although the report is mainly concerned with the more technical aspects of bacteriological control, there is much that is of direct interest to every milk producer. For example, it is suggested that the interpretation of tests for cleanliness depends to a considerable extent on the conditions of sampling. Instead of a procedure that involves the examination of samples at any time after production it is recommended that the samples should be kept at atmospheric temperature for a definite time after milking and then examined either immediately or after a definite period of refrigeration. The importance of uniformity in the methods of sampling and the treatment of samples before testing is duly emphasized. It is realized that, as the bacteriological result of any one sample is greatly influenced by atmospheric conditions, age on testing and treatment before testing, the efficiency of a milk producer should only be judged on a series of samples taken at frequent and regular intervals throughout the year. It is maintained that, whatever test is used, separate standards should be laid down

* *The Bacteriological Grading of Milk*.—Medical Research Council, Special Report Series, 206. Obtainable from H.M. Stationery Office at the addresses given on the cover of this JOURNAL, price 7s. 6d., post free, 8s.

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for summer and winter, and penalization should not be practised as long as a given proportion of samples, such as 75 per cent., conforms to these standards. The logical conclusion is that, for the routine bacteriological grading of milk, we require a simple, inexpensive test that has a small experimental error, and is capable of being used on a large scale by relatively unskilled workers.

Further, it is recommended that no attempt should be made to divide milk into more than three or four classes, as the number and activity of organisms in milk are determined by so many different factors that the establishment of numerous sub-divisions is entirely undesirable. From a public health point of view, probably only two divisions need be made on the basis of cleanliness, namely, (*a*) milk that is suitable, and (*b*) milk that is not suitable for human consumption in the liquid state.

On the basis of these general principles, each of the main bacteriological tests is subjected to critical examination and their range of utility defined. In particular, the plate count and coliform test are found to be deficient in several important respects, whilst a number of lesser-known tests are shown to be somewhat limited in their interpretation of cleanliness and keeping quality. Subsequently, the investigation is concentrated on the methylene-blue reduction test which has been used for a number of years on the Continent and in the Dominions, owing to its relative simplicity and the need for rapid results in milk depots and creameries where supplies of individual producers are bulked on arrival. As a result of this work, Professor Wilson recommends a modified test that is claimed to be simple, inexpensive and accompanied by only a very small experimental error, which should render it suitable for the grading of raw milk on the basis of cleanliness and keeping quality. The method is laid down in considerable detail, and it is strongly urged that with this test the frequency of sampling can be greatly increased at a fraction of the cost of the present bacteriological technique.

The report is undoubtedly an important contribution to the science of dairy bacteriology and should prove a valuable reference book to every progressive

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dairyman, bacteriologist, educationist and public health official. Finally, it may be noted that, after consultation with the Ministry of Health, the Medical Research Council has been glad to accept this report for publication as a statement of the scientific evidence on which possible administrative action may be based.

The Injurious Effects of Poisonous Plants and Seeds on Cattle

THE following interesting instances of injury to cattle owing to plant poisoning have recently come to the notice of the advisory staff in East Sussex and have been communicated by Mr. R. H. B. Jesse, Director of Agriculture under the County Council :—

(A) A number of cattle belonging to a dairy farmer in the County suffered severely from what appeared to be some kind of poisoning. The owner of the cattle very wisely promptly consulted his veterinary surgeon, who in turn advised consultation with another veterinary practitioner.

There were 58 cattle in the dairy herd and nine dry cows, and approximately 120 gal. of milk were being produced daily. Unfortunately, the illness was so serious that 16 cows and one bull died, and, in addition to this heavy loss, most of the milk yield from the remaining cows temporarily ceased. Further, within a short period after the illness, 12 cows had dead calves, and it was considered by the farmer's veterinary surgeon that this loss was due not to contagious abortion but to the result of some poisonous substance that had been eaten by the cattle.

Investigation showed that the affected cattle were receiving water from at least two different sources, so that the illness did not appear to be connected in any way with the water supply, whilst the hay being used came from different stacks. As a number of young stock being kept on the farm were unaffected, young stock being kept on the farm were unaffected, it was found possible to eliminate a number of suspected first submitted to the County Analyst did not reveal impurities likely to occasion loss, but from further samples seeds of foreign species were found, and eventually castor bean was found by the County

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Analyst in screw-pressed earth-nut cake obtained from the farm.

The extent of the loss in this case may to some extent be envisaged when it is pointed out that a sum exceeding £900 was paid to the farmer in settlement of his claim for loss.

(B) Another farmer lost five ewes within three days. An investigation was made, as the farmer suspected that the losses were due to parasitic worms. The condition of the sheep, however, indicated that this was improbable, since the sheep were in good store condition, whilst a post-mortem showed not only that they carried a considerable amount of fat internally, but that parasites such as liver fluke, the large and smaller stomach worms, and certain intestinal worms did not appear to be present. Suspicion concerning the cause of death was therefore diverted to the feeding stuffs being used, especially when it was ascertained that the farmer had just commenced to feed concentrates, and that the mixture consisted partially of screw-pressed earth-nut cake. The feeding of the screw-pressed earth-nut cake was immediately discontinued and the losses ceased. The intestines of the sheep appeared to indicate poisoning of some kind, and on submission of some of the earth-nut cake to the County Analyst, castor bean was detected.

(c) The occupier of a farm wrote stating that her cows were apparently suffering from the effects of poisoning, and that in all 22 cows were affected. It was first thought that acorns might have been the cause of the trouble, but when it was found that animals kept in house were also affected, and that similar concentrated food was being fed to cattle belonging to the owner on another farm with no ill effects, and that the water supply was being obtained from the main, it seemed probable that the illness might possibly be caused by the hay that was used.

It was ascertained that the beginning of the illness coincided with the commencement of a fresh stack of hay. In the hay were found considerable quantities of Yellow-Rattle (*Rhinanthus crista-galli*), Wild Vetchling (*Lathyrus pratensis*), Horsetails (*Equisetum* spp.), and Dyer's Greenweed (*Genista tinctoria*). As Yellow-Rattle is suspected of causing trouble to

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cattle and belongs to a family containing a number of known poisonous plants, and since, further, the seeds of the Wild Vetchling had matured, it was concluded that there was probably some connexion between the occurrence of these plants in the hay and the poisoning of the cattle, whilst the presence of *Equisetum* and Dyer's Greenwood was considered also as being probably a contributory cause to the loss. It is interesting to note that the cattle improved when other hay was used.

(D) Another farmer reported that the cattle on one of his farms invariably scoured badly when hay from one particular rick was fed to them. An examination of the hay was made. It appeared to have been made in excellent condition, but the cowman, a most observant man, was emphatic that acute scouring only occurred when hay from this particular stack was being fed. Examination of the hay showed that it had been made from "brook land" or alluvial soil and contained a considerable amount of Horsetails (*Equisetum* spp.) and also a quantity of Persicaria (*Polygonum persicaria*). The "scouring," probably due to the Horsetails, ceased when the feeding of this hay was discontinued.

Destruction of Grey Squirrels

THE grey squirrel is again becoming a serious pest of the countryside. In 1931 its numbers in this country were greatly reduced by an epidemic disease: it was, consequently, much scarcer in 1932 and 1933. Investigations in 1934 and 1935 showed, however, that the pest had made a substantial recovery and was spreading over fresh areas.

Those who know the grey squirrel for what it is, view this position with alarm, for, as a species quite distinct from the red squirrel, it does damage both throughout the countryside and in town parks and gardens. This damage consists mainly in the destruction of young birds and eggs, the young shoots of trees, fruit tree buds, and ground crops of various kinds.

The Ministry hopes that farmers and all others connected with agriculture or horticulture will do their

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utmost to encourage the destruction of grey squirrels by shooting and trapping, and so prevent them from spreading into other districts and establishing themselves there. It is important that strong measures against them should be taken even where they are few in number.

It is recommended that concerted action be taken at once by all concerned, and be continued unremittingly, so that the numbers of grey squirrels may be reduced as much as possible before the breeding season.

Wild White Clover Certification Scheme

FARMERS have long since realized the importance of pedigree livestock. Now the value of pedigree seeds is being more and more recognized.

In this connexion a scheme, jointly inaugurated by the National Farmers' Union and the Ministry is in operation, whereby certified stocks of wild white clover seed are made available to purchasers. The scheme provides for the inspection of pastures submitted under it and for a sample of the wild white clover seed from each field to be subjected to a growing-on test, conducted to ensure that the type of clover is suitable for registration.

Two classes of fields are eligible for recording, viz., Grade A. and Grade B. A Grade A. (old pasture) field is one that has been down to permanent grass for a period of not less than 10 years and has had no wild white clover seed sown on it in the meantime. A Grade B. (once grown) field is one that has been down less than 10 years but was sown with wild white clover seed from a genuine "old pasture."

If the field examination and the growing-on test give satisfactory results the field is "recorded" under the scheme and is given a number. At any future date the owner of a recorded field may apply for a certificate in respect of a crop of wild white clover seed obtained from it.

In all sales of certified seed the seller should quote the number of the certificate that has been issued and, conversely, the farmer who wishes to sow certified seed should insist on receiving the certificate number of the

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lot that is offered to him. A mere claim that a field has been inspected does not always mean that it has been approved and recorded.

Arrangements for the inspection of fields in 1936 must soon be made and applications from growers should be in the hands of the National Farmers' Union not later than April 15. Forms of application, together with the scale of charges for inspection, can be obtained from all County Secretaries of the National Farmers' Union. The scheme provides that farmers who are not members of the Union can obtain application forms from the same sources.

Seed Potatoes

THE following note has been communicated by the National Institute of Agricultural Botany:—

The time will soon be here for planting seed potatoes, and in this connexion growers may get valuable help from the leaflet that the Institute issues free of charge direct to farmers or through the County Agricultural Organizers or Horticultural Advisory Officers.

Growers are recommended to pay greater attention to the requirements of the consumer, and stress is laid on the enhanced price that is obtainable for ware of such varieties as King Edward and Golden Wonder.

First early varieties recommended are Arran Crest and Arran Pilot (both immune from Wart Disease), Epicure, Duke of York, Sharpe's Express and Eclipse. The earliest and heaviest yielding is Arran Crest. Arran Pilot has fulfilled its early promise and its 1934 acreage was more than trebled in 1935. Both Arran Crest and Arran Pilot are somewhat susceptible to virus diseases and care must be taken to obtain seed from a virus-free crop.

The only true second early worth growing is the old susceptible variety British Queen. Most of the early maincrops can, however, be lifted soon enough for this purpose, Great Scot (immune) and Arran Banner (immune) being particularly suitable.

The best of the maincrops in order of maturity are King Edward, Majestic (immune) and Arran Banner (immune). King Edward is the most popular variety

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with the consumer and consistently fetches higher prices than others. The yield is lower than those of the other two, and in order to produce a bold sample many soils require liberal manuring. Arran Banner yields heavily. Its tubers are apt to be coarse and it is recommended that the setts be planted not more than 12-14 in. apart.

Other varieties mentioned are Golden Wonder, improved stocks of which are now available, Arran Chief, for which King Edward should be substituted, and Kerr's Pink, which, although so widely grown in the north, has unshapely tubers and is very susceptible to blight and to virus diseases. Dunbar Cavalier is not recommended, although it is said to be an immune substitute for King Edward, as it is of poor cooking quality and is highly susceptible to virus diseases.

Whatever the variety grown, it is of the first importance that healthy seed be used. It is recommended that seed from virus-free stocks should be planted at least every second year. Growers would be well advised to obtain details of the work that is being carried out by the National Institute of Agricultural Botany at Ormskirk, on the production of reasonably virus-free seed in Lancashire.

Sampling Observations on Wheat 1935-36: Report for First Quarter

THE season 1935-36 is the fourth in which the full scheme of observations has been in progress. The ten stations taking part are the same as in 1933-34 and 1934-35. A summary of the observations for the first quarter is presented in the table below, the stations being arranged in order of sowing date. Weather conditions during November, December and January were very unsuitable for wheat, as the summary will indicate.

At six of the stations the wheat was sown, under fairly good conditions, between October 21 and October 29. Continued wet weather during the first three weeks of November delayed sowing at the remaining four stations until a month later.

The interval between sowing and appearance above

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ground again shows a marked correlation with the date of sowing. The opinion expressed in previous reports that the interval depended mainly on temperature has recently been confirmed by a statistical examination of the records of the first three years of the full scheme, from which a formula has been obtained to predict the length of the interval from the mean soil temperature during the interval. For the six stations where sowing took place in October, the interval ranged from 10 days at Long Sutton and Sprowston to 15 days at Woburn. It is interesting to note that in three of the four years the shortest interval has been 10 days. At the remaining stations germination was checked by the severe weather in December. At Wye and Plumpton the wheat

SAMPLING OBSERVATIONS ON WHEAT, 1935-36: FIRST QUARTER

Station	Variety	Sowing Date	Appearance above ground		Plant density per 32-metres drill	
			Date	Standard error of diff	First count	Date
Citencester, Gloucestershire	S H M *	Oct 21	about Nov 3		1,585	Nov 15
	Yeoman				1,547	
	Victor				1,490	
Long Sutton, Hampshire	S H M	Oct 23	Nov 2. 60†	± 0.210	1,958	Nov 23
	Yeoman				2,125	
Sprowston, Norfolk	S H M	Oct 24	about Nov 3	—	1,664	Nov 25
	Yeoman				1,030	
Woburn, Bedfordshire	S H M	Oct 28	Nov 12 25	± 0.109	1,683	Jan. 8
	Yeoman				1,501	
	Victor				1,418	
Seale-Hayne, Devonshire	S H M	Oct 29	Nov 10 81	± 0.212	2,206	Dec. 3
	Yeoman				2,201	
	Garton's No 60				2,192	
Rothamsted, Hertfordshire	S H M.	Oct 29	Nov 11 84	± 0.117	1,627	Dec. 2
	Yeoman				1,747	
	Victor				1,579	
Newport, Shropshire	S H M	Nov 25	about Jan. 28	—	—	—
	Yeoman				—	
Plumpton, Sussex	S H M	Nov. 29	before Jan 8		842	Jan. 29
	Yeoman				661	
Boghall, Edinburgh	S H M	Nov. 29	Feb 8 47	± 1.563	—	—
	Yeoman				—	
Wye, Kent	S H M.	Nov. 29	Jan 1 84	± 0.129	1,692	Jan. 25
	Yeoman				1,856	

* Squarehead's Master.

† Based on 16 instead of 32 observations per variety.

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appeared during the short mild spell in the first week of January, at Newport appearance was delayed until January 27 and at Boghall until February 8. In none of the three previous years was appearance delayed until January.

Squarehead's Master appeared later than Yeoman at five of the six stations at which the difference in date was observed, but the differences were quite small, the average, apart from Boghall, being 0.32 days. The local variety, where grown, appeared slightly later than the standard varieties.

The first plant number count is taken about three weeks after appearance above ground. The counts for Newport and Boghall are not yet available. Plant numbers are slightly lower than last year. There is no sign so far this year of any consistent varietal difference in plant number, each standard variety having a higher plant number at four stations out of eight. The same result was found in 1933, but in 1932 and 1934 Yeoman gave generally a higher plant number.

Agricultural Statistics, 1934 :

Prices and Supplies of Agricultural Produce

THE Ministry's Annual Report on the prices and supplies of agricultural produce and requirements, relating to the year 1934, was published on Thursday, February 20. The Report discusses the movements in prices and changes in sources of supply of the principal agricultural commodities in the year 1934 in comparison with those in previous years. An important feature of the year 1934 was the scheme of subsidy payments to producers of fat cattle which was brought into operation on September 1. This matter is dealt with at some length in the Report. The review of the quantitative regulation of imported produce contained in the Report for 1933 has been brought up to date and the recent changes in Customs duties are included in an Appendix which shows in detail the period of operation, amount of duty, etc.

Copies of the Report, which forms Part II of the Agricultural Statistics, 1934, may be purchased through any bookseller or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C. 2, price 2s. net. or 2s. 2d. post free.

THE EFFECT OF SOWING FERTILIZERS IN CONTACT WITH THE SEED OF BARLEY AND OF SUGAR-BEET

J. A. McMILLAN, B.Sc., *Cambridgeshire County
Council*, and F. HANLEY, M.A.,
School of Agriculture, Cambridge.

COMBINED seed- and manure-drills have been in regular use in certain parts of the country for many years, for instance, in the Fens, where on many farms it is still customary to drill a certain amount of fertilizer and "ashes" with the seed of several crops. The practice of drilling seed and fertilizer together, however, has shown little tendency to spread to other districts until recent years, when the possibility of completing two operations at once has attracted the attention of a number of farmers, particularly those who have developed a system of mechanized farming. In passing, it may be mentioned that the method is practised to some extent in other countries.

From observations on sugar-beet and mangold growing in the Fens some years ago, it seemed to the writers that a small dressing of superphosphate drilled in the rows at a slightly lower level than the seed stimulated growth in the seedling stage, but the effects of such initial gain were rarely discernible by the end of July. Certain other fertilizers, on the other hand, appeared to delay germination when drilled in close proximity to the seed, particularly muriate of potash and potash salts, and both "plant" and yield were reduced on several experimental plots through that circumstance.

In 1932, it became possible to carry out field trials on a light chalk soil in south Cambridgeshire. After a preliminary trial in that year had indicated the likelihood of obtaining real differences between the results from fertilizers drilled with the seed and the same fertilizers broadcast, properly replicated trials were carried out on the barley crop at two farms on

SOWING FERTILIZERS WITH BARLEY AND SUGAR-BEET

light chalk soil in 1933, two in 1934 and one in 1935, and on sugar-beet on loam soils at one farm in 1933 and at two farms in 1934. In all these trials, the fertilizer, when drilled with the seed, was actually drilled down the same coulter as the seed, so that the two were in direct contact, a circumstance which does not obtain with the type of drill, found on many Fen farms, in which the fertilizer is delivered down separate coulters running in front of the seed coulters.

Experiments on the Barley Crop.—On one farm, in each of the years 1933 and 1934, the experiment was complicated, as far as the original intention of the trial was concerned, by a very serious attack of wireworm, but the plots provided extraordinarily interesting results in regard to the incidence of this pest. Fertilizer, applied broadcast, enabled the barley seedlings to grow away better from the wireworm attack than on the plots receiving no fertilizer, whilst plots on which the fertilizer was drilled in contact with the seed carried an almost perfect plant.

Since the draft of this report was prepared, the attention of the writers has been drawn to a similar instance of the control of wireworm by drilling fertilizer with the seed. Some 30 years ago, Mr. J. W. Moss gave a talk at the East Anglican Institute of Agriculture, Chelmsford, on "Harnessing the Wireworm," in which he described how the crop on one portion of a field of barley on his farm drilled with a combined seed and fertilizer-drill, that was delivering seed only owing to a breakdown in the mechanism of the fertilizer barrel, was eaten off by wireworm and the ground overrun with weeds, especially water-grass, whilst other parts of the field drilled with the same drill when working properly, i.e., drilling seed and fertilizer together, gave an excellent plant of barley, free from weeds. Mr. Moss expressed the opinion that, in this instance, the fertilizer mixture (superphosphate, castor meal and areca nut husk meal), being of a light powdery nature, was deposited in a wider "row" than the barley grains and therefore protected the barley from the wireworms, which, in consequence, fed on and destroyed the weeds between the rows; whereas, in the absence of fertilizer, the wireworms, preferring

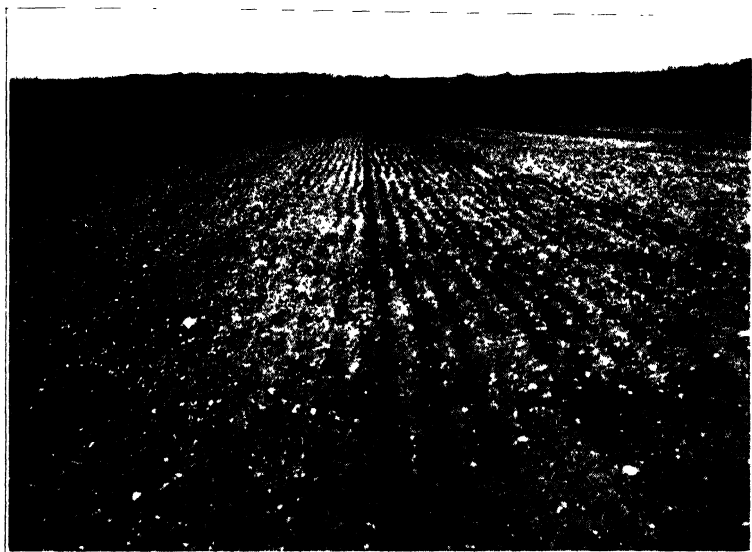


Photo: School of Agriculture, Cambridge
Barley on Light Chalk Soil. The good strips had fertilizer drilled with the seed, whilst the other strips had fertilizer broadcast or received no fertilizer. Wireworm damage was less severe where fertilizer was drilled with the seed (see Table I in text, p. 1297).

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the barley plants, fed on them and left the weeds untouched.

The experiment reported in Table I below was carried out on land growing very few weeds, and so afforded no evidence as to the extent to which wireworms will destroy weeds in circumstances such as those described above, though it is of interest to note that large numbers of wireworms were present on all the plots, but the amount of damage they caused varied with the fertilizer treatment.

To give some idea of the crop differences due to the wireworm attack, the results obtained at Centre 4 in 1934 may be of interest.

TABLE I.—Yields of Barley in Cwt. per Acre at Centre 4
(Crop attacked by Wireworm)

		Grain Cwt.	Straw Cwt.
Fertilizer drilled with seed	..	12.4	14.7
.. broadcast	..	4.1	6.7
No fertilizer	..	1.3	3.4

(Fertilizer = 5 cwt per acre, of a mixture having the following analysis:—N = 3.3 per cent.: K_2O = 2.5 per cent Sol. P_2O_5 = 10.5 per cent, Insol. P_2O_5 = 1.9 per cent.)

At the four centres where few or no wireworms were seen, the average yields were still in favour of drilling the fertilizer with the seed, though the differences were much less, as will be seen from Table II.

TABLE II.—Yields of Barley, in Cwt per Acre
(No serious Wireworm damage)

	1933		1933		1934		1935	
	Centre 1		Centre 2		Centre 3		Centre 5	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Fertilizer drilled with seed	18.2	25.2	26.7	39.6	16.8	18.1	11.3	13.1
Fertilizer broadcast	15.4	22.7	23.7	33.6	15.5	17.7	9.0	10.6
No fertilizer	13.8	19.2	21.5	33.7	13.1	15.5	7.3	9.0
Standard Error	0.47	0.78	0.87	1.44	0.73	0.91	0.99	0.98

(Differences in yield exceeding 3 times the standard error may be regarded as real differences due to the fertilizer.)

Sowing the fertilizer in contact with the barley seed seemed to cause a slight delay in germination, but the plants on these plots soon caught up with those on the other plots, and went ahead about three weeks from the first appearance of the barley seedlings above

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ground. In mid-season, the differences between the "drilled," broadcast and untreated plots were most marked, the plants on the first-named plots being taller and of a richer green colour than those on the broadcast plots, while the untreated plot presented a somewhat starved appearance in comparison and the individual plants were later in producing tillers. Subsequently, differences seemed to become less and less obvious until the time of ear emergence, when the "drilled" plots were slightly earlier. At harvest time, the "drilled" plots were still slightly earlier than the broadcast and untreated plots, the ears being bent over, whilst ears on other plots were still erect.

In each year, samples of grain were drawn from the plots and submitted to a barley expert for examination. In no case did his report suggest that there was any difference in the quality of the grain that could be attributed to the treatments.

Experiments on the Sugar-beet Crop.—At the three sugar-beet centres, 4 cwt. per acre of a complete sugar-beet fertilizer were used, but in no instance were any appreciable differences in crop growth observed, except for slower germination and a rather smaller final plant population on the plots where the fertilizer was drilled with the seed. Further trials with sugar-beet are required before more definite generalizations may be made.

Germination Experiments using small Hand Drill.—In view of the increasing number of requests for guidance in this matter, and the tendency on some farms, with no proper combined drill, to mix seed and fertilizer together and subsequently drill the mixture with an ordinary seed drill, it seemed desirable to obtain more definite information, particularly regarding the effects of individual fertilizers. With the assistance of Mr. Culpin, Lecturer in Agricultural Engineering at the School of Agriculture, Cambridge, a single-row hand seed-drill was modified to sow, at will, seed and fertilizer alone or together, and down the same or different coulters. During the season 1935, plots were drilled with this small drill on the Cambridge University Farm, at Snailwell nr. Newmarket, and, in co-operation with Mr. F. Rayns, at the Norfolk Agricultural Station at Sprowston.

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The object of the hand-drill plots was primarily to test the effects of individual fertilizers, when sown in close proximity to the seed of different crops, on the speed and percentage of germination. The results of these trials are too lengthy for full discussion in the present article and only a brief reference to the more outstanding points will therefore be made at this stage. With *barley* drilled in rows 8 in. apart, 1 cwt. per acre of superphosphate or sulphate of ammonia, sown down the same coulter as the seed, tended to stimulate early germination and increased the total number of seedlings, whereas 3 cwt. per acre of superphosphate, or 2 cwt. per acre of sulphate of ammonia, retarded germination. Muriate of potash sown down the same coulter as the seed retarded germination at both 1 and 2 cwt. per acre.

These results refer, of course to *barley* in only one season under cold, dry soil conditions, i.e., conditions definitely unfavourable to germination.

With *sugar-beet*, drilled in rows 18 in. apart, 1 cwt. per acre of superphosphate down the seed coulter had little effect on germination; but 3 cwt. per acre proved slightly harmful in comparison with the same dressing broadcast. As regards sulphate of ammonia, 1 cwt. per acre down the seed coulter had little effect, but 2 cwt. per acre seriously retarded germination, there being very few seedlings visible until 10 to 14 days after the appearance of seedlings on the "broadcast" plot. With potash, 2 cwt. per acre of muriate down the seed coulter was very similar in its effect on germination to 2 cwt. per acre of sulphate of ammonia, i.e., definitely harmful, and 1 cwt. per acre was almost as harmful as 2 cwt.

The figures in Table 3 relate to experiments carried out in 1935, and serve to illustrate what may happen when barley and sugar-beet seeds are sown in contact with fertilizer under dry soil conditions, the seeding being followed by a period of dry weather.

Under moist soil conditions, different results would probably be obtained, and the writers wish to make it quite clear that the figures must only be interpreted as indicating what may happen under unfavourable conditions and not necessarily what will happen under other conditions of soil and rainfall.

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TABLE III.—AVERAGE NUMBER OF SEEDLINGS PER 1 YARD OF ROW

Fertilizer			Barley			Sugar Beet			
Type	Quantity, cwt.	Method of application*	May 7	May 13	May 24	May 19	May 24	May 30	June 6
Muriate of Potash	1	B	9.5	10.9	10.6	2.6	8.1	26.2	45.8
	1	S	6.0	7.6	7.9	1.8	2.9	9.6	40.5
	2	S	2.9	5.2	5.3	0.6	1.1	4.2	37.5
Sulphate of Ammonia	2	B	12.7	12.8	13.0	1.5	3.6	18.2	45.0
	2	S	4.7	6.1	6.5	0.1	0.5	4.0	39.5
	1	S	11.4	13.5	13.6	1.3	5.5	16.7	37.2
Superphosphate	3	B	9.1	10.7	11.0	2.7	13.1	34.3	47.9
	3	S	7.1	7.6	7.3	2.6	6.5	19.5	33.5

* B = Fertilizer sown broadcast.

S = Fertilizer drilled down same coulter as seed

The barley was sown on April 30 and the sugar-beet on May 3. No rain fell after seeding until May 13.

Summary.—To summarize these experiments, therefore, it appears that, for *barley*, sowing both seed and fertilizer down the same coulter, may be definitely advantageous, but only in certain circumstances; under other conditions harm may result. It seems probable that any beneficial effect is due primarily to the superphosphate, though possibly in part also to any sulphate of ammonia in the mixture, provided the amount of the latter is only small as would normally be the case with a barley fertilizer. The use of muriate of potash, and perhaps also potash salts, in a manure mixture to be drilled in this manner, is apparently attended by very definite risks, especially when there is little moisture in the soil.

The results of the trials with the hand-drill suggest that the effects of drilling seed and fertilizer down a single common coulter, differ somewhat from those obtained by the use of separate seed and manure coulters, the latter arrangement usually reducing any harmful effects from a given quantity of the fertilizer, and it is worthy of note that, in some instances, the use of small quantities of superphosphate or sulphate of ammonia down a separate coulter appeared actually to stimulate the growth of the seedlings.

As regards *sugar-beet*—proximity of fertilizer to seed seems to be fraught with considerable risk to germination, especially under dry soil conditions, and,

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though small quantities of sulphate of ammonia or superphosphate sown down a *separate* coulter appeared to assist the growth of the seedling, it seems undesirable at this stage to advocate the application of heavy dressings of complete mixtures of superphosphate, sulphate of ammonia and muriate of potash in close contact with the seed of sugar-beet, since any beneficial effect of one fertilizer may be more than outweighed by the harmful effect of another, if soil and weather conditions chance to be dry at seeding.

It should be borne in mind that the old Fen type "combine," or "compass," drill delivered fertilizer down a separate spout, and placed it at a lower level in the soil than the seed; also, that dry soil conditions at seeding time are much less common in the Fens than on light highland soils. There are, of course, a number of instances on record of the successful sowing of a moderate dressing of artificials close to the seed of the sugar-beet crop on highland soils, but other instances amply demonstrate the risks of this practice under unfavourable soil conditions.

The whole question of drilling seed and fertilizer together, therefore, requires very careful consideration in regard to the actual crop to be sown, the type and quantity of fertilizers to be used, the type of drill, i.e., the relative position in which seed and fertilizer are placed in the soil, and last, and probably most important of all, the soil conditions at and after the time of drilling.

In field trials with early-sown barley, under moist soil conditions, drilling the fertilizer in close proximity to the seed gave definitely better yields than were obtained on the plots where the same quantities of fertilizer were broadcast on the seed bed. Other trials, however, have demonstrated what may easily happen with barley and sugar-beet under drier soil conditions, whilst the effect may also vary with different crops.

Further experiments, both in the field and in the laboratory, are in progress, and it is hoped to communicate the results of these at a later date; but the problem appeared to be of sufficiently wide importance to justify the immediate publication of this, admittedly incomplete, account of the subject.

INVESTIGATIONS OF FROST DAMAGE TO HORTICULTURAL CROPS, WITH SUGGESTIONS FOR FUTURE WORK

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BEFORE giving the results of this survey, it is perhaps necessary to describe briefly its origin and scope.

When the severe but patchy effects of the frost of May 16-17, 1935, became apparent, it was thought at the East Malling Research Station that there was a unique opportunity for investigating the various factors involved in the occurrence of frost and its damage to horticultural crops.

Accordingly several members of the Pomology Staff of the Station made a detailed survey of as many farms as possible in parts of Kent, and this was supplemented with information obtained from the fruit-growing members of the Research Station. The survey covered parts of the Lower Greensand or Ragstone, the Hastings Beds or High Weald, the Swanley area and North Kent.

The main limitation of such a survey is the fact that there are nearly always unknown or uncontrolled factors. A list of factors that may conceivably affect the amount of frost damage—altitude, aspect, shelter, manuring and cultivation, age of tree, state of the blossom and varietal susceptibility—shows how complicated the whole question is. There are also to be considered the apparent amount of damage before or after the frost and the presence of a pollinating variety.

The first factor of which many farmers probably think in connexion with frost damage is altitude. Height in itself, however, is no protection against frost; nor are all low places subject to severe damage. On both the Lower Greensand and High Weald, height in relation to the surroundings was found to be of more importance than actual altitude.

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In general, however, low places were frosted, and in the following table, based on the replies to the questionnaire, there is an indication that more fruit was lost at low altitudes than at high altitudes.

TABLE I.

	ft 0— 100	ft. 100— 200	ft. 200— 300	ft. 300— 400	ft 400— 500	ft. 500— 600	ft. 600— 700	ft. 700+
	Number of plantations very small.							
% of lost crops	38.9	44.5	34.0	34.0	27.0	-	-	-
% of *Z crops	14.3	33.3	22.0	18.4	36.4	33.3	-	-
% of fair crops	34.8	11.0	13.0	18.4	27.0	33.3	-	-
% of full crops	12.3	11.1	29.5	29.0	9.1	33.3	-	100

*Z crops are those where, in sloping plantations, there is more fruit at the higher level.

Between the altitudes of 0 and 100 feet, there were fewer losses and more fair and full crops than one would expect. This is probably due to the warming effect of the sea. Above 100 feet the percentage of lost crops decreases and that of fair and full crops increases, with increase in altitude. This may be because in South-East England, plantations lower than the surrounding land are less frequent at high altitudes than at low altitudes.

There were many strange effects of this frost and some apparently inexplicable, but much that is apparently contradictory may be explained on the following hypothesis. The north-east wind that had possibly caused considerable damage during the days preceding May 16 was still blowing very gently in many places during the night of May 16-17. As the freeze began and very cold air collected, this light wind removed the cold air from plantations into which it was able to blow, and though cold itself, did much more good than harm. This hypothesis is supported by the replies to the questionnaire. To illustrate the point, it is necessary to describe the system on which they were classified.

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Plantations were divided into two groups—"H" and "L," the first on hill-tops and the higher parts of hillsides, and the second on lower parts of hillsides, valley bottoms and low plains. These were then sub-divided into four groups, according to whether they were flat or on a gentle, medium or steep slope. Within each of these groups were four further subdivisions for aspect. The plantations were also divided according to the crop—those in which there was total loss, a fair or full crop, and where there was less fruit on the lower than on the upper parts of a slope. While the numbers in some groups are small, Table II shows that with "H" plantations there are more full crops in those with north and east aspects than in those facing south and west. Though these differences are not significant, the smaller number of Z cases in plantations with north and east aspects is a further point in support of the hypothesis. With "L" plantations the differences are much smaller. The importance of air drainage is well shown in the absence of lost crops and the preponderance of full crops on steep slopes (Table III). Z crops are found most frequently on medium slopes.

TABLE II.—EFFECT OF ASPECT :

"H" Plantations

	North	East	South	West
	⁰ / ₀	⁰ / ₀	⁰ / ₀	⁰ / ₀
Lost crops ..	18.5	21.4	20.3	19.3
*Z crops ..	10.1	18.6	28.2	38.8
Fair crops ..	32.0	21.5	24.9	21.5
Full crops ..	39.3	38.4	26.4	20.4

TABLE III.—EFFECT OF SLOPE :

"H" Plantations

	Gentle	Medium	Steep	Mean
	⁰ / ₀	⁰ / ₀	⁰ / ₀	⁰ / ₀
Lost crops ..	35.3	24.3	0	19.9
*Z crops ..	19.5	33.9	18.3	23.9
Fair crops ..	15.8	22.5	36.6	24.9
Full crops ..	29.3	19.1	45.0	31.1

* See note to Table I for definition of Z crops.

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As regards the effect of the early morning sun is concerned, experience is contradictory. If a plantation was exposed to the sun on the early morning of May 17, it was also exposed to all the north-east wind that blew before the frost, and either factor, or both, may have been responsible for the damage. This wind may have had a bad effect in more than one way. It may have reduced pollination, either by preventing the bees from working or by so lowering the temperature and drying the stigmas that the process of fertilization was made impossible. It may also have so cooled exposed plantations that when the temperature became further reduced, resulting eventually in frost, they suffered more severely than plantations that were sheltered.

This leads directly to the question of wind-breaks or shelter belts. As already indicated, it may be that where the light north-east wind blew into a plantation during the night, it was helpful. On almost flat land at higher altitudes, the good effect of shelter belts in keeping the plantation warm before the frost may have been more than enough to counterbalance their bad effect in keeping wind out during the night. In fact, there were found a number of high, almost flat, well sheltered plantations in which there was a good crop. There were also plantations, on a slope, in which the only fruit was immediately below shelter belts at right angles to the direction of slope, and from the point of view of frost, such belts are definitely harmful, since they retard the flow of cold air down the slope and cause it to pile up against them. Warm air coming from within a wood or thick belt of trees and spreading a few feet outwards is probably the cause of fruit being found on a tree or half a tree immediately adjoining. Here again there may be alternative explanations, such as shelter from wind before the frost or protection from the early morning sun following it.

Where the land was in a stepped or terraced form with a southern slope, fruit was only found in the lee of the ridges, with an entire lack of crop in small valleys cutting through them. This may have been due to the cold air flowing down the slope with some velocity, passing over the part in the lee of each ridge and collecting in the valleys.

FROST DAMAGE TO HORTICULTURAL CROPS

The evidence regarding the effect of manuring, cultivation and age of tree on the amount of damage, was also contradictory. Manuring and cultivation are closely connected with each other and with time of blossoming.

Many people wonder whether the blossom following two heavy crops would have been strong enough to set well had there been no frost. From the fruit seen in healthy plantations that escaped the frost, it appears probable that it would have set. In some crowded plantations, however, it might have been too weak to set except on outside trees, which get more light and food and can form strong fruit buds even when carrying a crop. There is also the possibility, however, that cold air in the middle of such plantations remained stagnant, whereas round the edges it was moved by the light wind.

The last factor, but by no means the least important, is varietal resistance. The value of this was stressed by Mr. H. V. Taylor in a paper read at the Conference of Empire Meteorologists in 1929. He gave the comparative resistance of the main varieties of apples, plums, pears, black currants, gooseberries and strawberries as shown by the reports made to the Ministry of Agriculture. While the East Malling survey has not received reports or made notes on as many varieties as were then given, those that it has are in the main in the same order. Several variable factors are concerned, including the date and duration of the blossoming period, the relative susceptibility of varieties, and differences in susceptibility of one variety at various stages in development from the bud to the fruitlet. Where the susceptibility of different varieties appears to vary from year to year it may be that, though the relative order of blossoming is the same, the frost comes at a different point in the whole blossoming period.

To sum up, emphasis should be laid on the value of height relative to that of the surrounding land; the good effect of nearness to large rivers or the sea; the lack of evidence with regard to manuring and cultivation; the good and bad effects of windbreaks, and the variation in susceptibility to damage among varieties.

FROST DAMAGE TO HORTICULTURAL CROPS

The results of this survey and a review of the literature made by Mr. C. Cornford, with the aid of the Imperial Bureau of Fruit Production, have shown that information is required in a number of directions if the full benefits of frost prevention are to be obtained.

The susceptibility of the plant to frost damage is of primary importance and should be found for each kind and variety of fruit, with the exact nature of damage to the various parts of the tree, and the effect of root-stock, age of tree, density of foliage, manuring and cultivation. The effect of early morning sunshine on frozen tissue and of cold winds before and after the frost should also be considered.

It is hoped that some of the limitations of existing methods of frost prediction may be overcome and that it will be possible to investigate various methods of frost prevention. The most important phase of such investigation would be concerned with air currents and cold air drainage and would be a continuation of work begun by G. S. P. Heywood. Katabatic winds, i.e., winds caused by the flow of cold air down a slope, are of considerable importance in connexion with the prevention of frost damage, as they may not only influence the severity of frost within any given orchard but also modify the results of heating the orchard. An accurate knowledge of such winds should enable the farmer to increase the efficiency of heating methods. In some plantations it would lead to the abandonment of heating methods, while in others the heaters could be placed in positions of maximum advantage. The East Malling survey included visits to several farms on which orchard heating was practised. At that of Mr. Harrington of Bedford the heaters appeared to have prevented frost damage. Further reference is made to these results by Mr. Hoare (see next page of this issue). On a large farm in Kent a similar success was obtained. On some others, however, results were rather less definite. One farmer had obtained very good results in a valley that had been regularly frosted in previous years, but used 75 heaters to the acre and had to refuel after four hours' burning. This failure of the lamps to burn for the normal time was also reported elsewhere. On still another farm

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crops were equally good in heated and unheated areas, and it is therefore doubtful whether in this instance the frost was severe enough to have caused damage in any event.

The experience of 1935 has shown the need for further investigation of the frost problem, but growers would probably benefit greatly by work on the many other meteorological factors that play a part in the production of high quality fruit, and it is hoped that such investigations will be part of a much wider scheme of research.

ORCHARD HEATING

A. H. HOARE,

Ministry of Agriculture and Fisheries.

MANY investigations have been carried out in recent years, both in European countries and in America, with the object of discovering an economical and satisfactory method of protecting fruit trees from damage by frost after the trees have reached the blossom stage.

Unseasonable frosts are fortunately not common in this country, but when they do occur, as in mid-May, 1935, widespread damage, amounting in many instances to total loss, usually results. It must be borne in mind that one night's damaging frost may not only ruin or greatly reduce the crop and so destroy the value of the whole year's work and expenditure, but highly manured trees carrying no crop suffer a disturbance in balance, and the crops of the following and subsequent years may be affected.

Briefly, the methods of protection against frost damage, which have been investigated, are as follows :—

- (1) Covering the crops with cloth or paper.
- (2) Circulating the air.
- (3) Humidifying the air.
- (4) Blanketing the orchard with a smoke cloud.
- (5) Heating the air.

Investigators have found that neither of the methods (2) and (3) has proved effective, while methods (1) and (4), although effective with some types of frost,



FIG. 1 Orchard Heating - Mr. A. G. Harrington's System



Photos - Courtesy of George Monro, Ltd.

FIG. 2 The Harrington Heater System in Operation, May, 1935

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failed with others, and, moreover, were impracticable and too expensive when conducted on a large scale. Method (5), heating the air, has given encouraging results.

The object of heating the air is of course to prevent the temperature of the orchard falling below freezing point, i.e., 32° F. Many devices, including coke braziers, generating heaters, distilling heaters and oil burners, have been employed for this purpose, but from the point of view of cheapness, simplicity of working and effectiveness the last-named have given the best results.

Mr. A. G. Harrington, of the Putnoe orchard, Bedford, has devised a liquid fuel burner to maintain the air temperature of orchards above the danger point. This heater consists of a metal canister having a flame hole, covered by a lid, in the top, and six air holes in the side separated by a quarter of the circumference. The wicks are made of asbestos rope so that they can be used throughout the season without renewal by simply resoaking them in the fuel oil when the latter is renewed. The heaters are designed to burn crude oil.

The minimum number of these heaters to the acre should be 50, and if properly distributed they are capable of raising the temperature of the orchard by 7-8° F. They have been used by some growers at the rate of 60 to the acre, and at this concentration have secured a rise of 10-12° F. in the temperature.

The heaters are now designed to burn for a period of 11-12 hours. The fuel capacity is 3 gal. From the time of lighting up, the oil is consumed at a fairly regular rate down to the last gallon. This is ensured by the special design of the air holes, four of which, each provided with tubes of varying lengths, are so designed as to give the necessary delayed action of further supplies of air as the level of the oil is lowered.

The use of orchard heaters necessarily involves the adoption of a frost alarm system, unless a night watchman can be employed to give the warning. Mr. Harrington's alarm system consists of a Negretti and Zambra maximum and minimum thermometer with one wire on the left-hand side set at 33° F. and the other in the mercury at the bottom. When the temperature falls to 33° F. the circuit is closed and a

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bell is set ringing in the proprietor's bedroom. This gives time for the lighting force to be mustered and enables all the heaters to be started before the temperature falls to freezing point. The heaters can usually be lighted in $\frac{1}{2}$ – $\frac{3}{4}$ of an hour by a properly trained lighting force. In that time one man can light the heaters for 2–3 acres.

The conclusions to be drawn after the tests of the system provided by the severe frosts of May, 1935, are that orchard heating is practicable provided the organization is good, the number of heaters to the acre is not below the minimum laid down, and that there is little or no wind. The heaters must be refilled in the morning after a frost even if they have only burned for an hour, and at least three days' supply of fuel oil should always be on hand. Some growers employ their small-power spraying machines for refilling, the oil being pumped direct from 40 gal. drums.

BEET SUGAR INDUSTRY IN GREAT BRITAIN

Financial Position of the Factory Companies

THIS article reviews the financial position of the beet sugar factory companies as at March 31, 1935, and the trading results of the 1934-5 campaign. It is supplementary to the information given on the subject in the "Report on the Sugar Beet Industry at Home and Abroad" *(1924-5 to 1929-30 campaigns) and continued in the issues of this JOURNAL for February, 1932 (1930-1), March, 1933 (1931-2), February, 1934 (1932-3), and May, 1935 (1933-4).

Table I (see Table 67 and Appendix H of the Sugar Beet Report) is a composite balance sheet of all the companies—there are 15 operating 18 factories—and shows the financial position as at March 31, 1935. Figures for the previous year are given for comparison. Reserves and credit balances on Profit and Loss Account total £2,464,690, of which £513,762 was appropriated for payment of dividends, equal to 11.3 per cent. on the total share capital, and £1,360 for special Directors' fees, leaving £1,949,568 to be carried forward. Dividend payment in the previous year amounted to £370,392 or 8.3 per cent. and in 1932-3, to £237,993 or 5.4 per cent.

The position in regard to capital expenditure on factories and equipment to March 31, 1935, is as follows:—

Total expenditure	£9,212,866
Less: Depreciation	£3,945,821
Written off on reconstruction	153,288
	4,099,109
Balance as per Table I	£5,113,757

Investments total £966,028, of which £777,350 is invested in associated companies, comparing with £854,501 and £769,325 in 1933-4 and £815,287 and £733,829 in 1932-3. The capital cost per ton of beet

* Economic Series No. 27: H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, 1931. (Price 6d. net, post free 1s.)

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worked was £2.25 as against £2.7 in the 1933-4 campaign and £3.9 in 1932-3.

Table II (see *Table 70* and *Appendix F* of the *Sugar Beet Report*) has been compiled from data supplied by the factories, and shows, in total and per ton of beet worked, manufacturing costs and overhead charges under the main sub-heads of expenditure. The total cost per ton of beet was 8*d.* less than in 1933-4 and 1*s.* 8*d.* less than in 1932-3.

Table III (see *Table 91* and *Appendices F* and *G* of the *Sugar Beet Report*) summarises the trading and profit and loss accounts for the financial year ended March 31, 1935 (1934-5 campaign). Figures for the previous year are given for comparison. The total income from products, after deducting Excise Duties paid but before crediting subsidy, was £7,699,354 or 37*s.* 7*d.* per ton of beet, the figures for the previous year being £6,152,264 or 37*s.* 3*d.* and for 1932-3, £4,482,495 or 40*s.* 2*d.* The cost of sugar beet, £8,342,966, represented 68 per cent. of the net total factory income from products including subsidy, this percentage being the same as for the preceding year and 1 per cent. lower than in 1932-3. The net profit on beet trading equalled 7*s.* 7*d.* per ton of beet worked and on subsidiary industries 7*d.* per ton, making a total net profit for the year's trading of 8*s.* 2*d.* per ton. In 1933-4 the corresponding figures were profits of 6*s.* 11*d.* and 6*d.* totalling 7*s.* 5*d.* per ton, and in 1932-3, 5*s.* 11*d.* profit and 3*d.* loss, making a net total of 5*s.* 8*d.* per ton. The total profit in 1934-5 showed an increase of 9*d.* per ton over 1933-4 and 2*s.* 6*d.* per ton over 1932-3.

The appropriations of the profits from the year's trading amounted to £1,455,764, leaving a balance of £224,495 to be carried forward. In relation to the total capital employed (£6,323,819) the amount distributed in dividends and interest, less interest received from investments, was £546,287, or 8.6 per cent., the amount applied to writing down fixed assets, 5.6 per cent., and the amount placed to reserve, 4.5 per cent.

The quantity of beet worked at the factories in the 1934-5 campaign was 4,094,707 tons (washed and topped weight) and the duration of the campaign, 122 days, comparing with 3,298,119 tons and 107 days in 1933-4, and 2,232,061 tons and 80 days in 1932-3. The

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average daily throughput of beet was 33,563 tons in 1934-5, 30,824 tons in 1933-4, and 27,901 tons in 1932-3, comparing respectively with daily rated capacities of 31,900 tons, 29,950 tons and 25,350 tons (excluding the factory which did not operate in the 1932-3 campaign with a capacity of 1,000 tons per day). The production of sugar, expressed in terms of commercial white sugar, was 601,333 tons against 455,337 tons in 1933-4 and 324,563 tons in 1932-3.

TABLE I.

SUMMARY OF BALANCE SHEETS OF BRITISH BEET SUGAR
FACTORY COMPANIES AS AT MARCH 31, 1934 AND 1935.

	As at March 31		Increase or Decrease
	1934	1935	
	£	£	£
LIABILITIES.			
Share Capital	4,445,954	4,550,954	+105,000
Mortgages and Debentures	1,384,522	1,319,017	—65,505
Bank and other Loans ..	1,082,930	453,848	—629,082
Sundry Creditors and Outstandings	1,050,701	1,187,445	+136,744
Reserves*	1,455,912	1,557,483	+101,571
Profit and Loss Balances before appropriation of Dividends, <i>less</i> Deficits	537,982	907,207	+369,225
Total Liabilities	9,958,001	9,975,954	+17,953
ASSETS.			
Beet Sugar Factories and Equipment, <i>less</i> Depre- ciation	5,195,365	5,113,757	—81,608
Investments	854,501	966,028	+111,527
Stocks and Stores	2,362,024	1,784,860	—577,164
Sundry Debtors and Pre- payments	980,107	760,674	—219,433
Cash Balances	566,004	1,350,635	+784,631
Total Assets	9,958,001	9,975,954	+17,953

* Including capital reserves; also special reserves amounting to £92,247 in 1934 and £10,000 in 1935. (In 1934, £83,247 represented advances under the British Sugar Industry (Assistance) Act, 1931, which were contingently recoverable. Although the liability to repay advances did not expire until September 30, 1934, a number of factories brought them into credit of profit and loss at March 31, 1934, by which date the manufacture of sugar and, therefore, the contingency of the liability had ceased).

BEET SUGAR INDUSTRY

TABLE II.

MANUFACTURING COSTS AND OVERHEAD CHARGES OF BRITISH BEET SUGAR FACTORIES FOR THE CAMPAIGN YEARS 1933-34 AND 1934-35. TOTAL AND PER TON OF BEET WORKED.

	1933-4		1934-5		Increase or decrease per ton of sugar beet
	Total	Per ton of beet	Total	Per ton of beet	
	£	s. d.	£	s. d.	s. d.
Coal and coke ..	420,033	2 6	503,156	2 5	-0 1
Limestone ..	84,020	0 6	100,192	0 6	--
Bags ..	187,833	1 2	269,043	1 4	+0 2
Other manufacturing supplies ..	110,589	0 8	112,268	0 6	-0 2
Repairs and maintenance ..	140,747	0 10	201,526	1 0	+0 2
Salaries and wages	689,012	4 2	784,817	3 10	-0 4
Rates and insurance ..	49,252	0 4	54,384	0 3	-0 1
Other general charges ..	86,857	0 6	96,170	0 6	--
Beet expenses ..	201,150	1 3	181,548	0 11	-0 4
Total	1,970,393	11 11	2,303,104	11 3	-0 8

TABLE III.

BRITISH BEET SUGAR FACTORY INCOME, EXPENDITURE AND PROFITS FOR THE YEARS ENDED MARCH 31, 1934, AND 1935. TOTAL OF ALL FACTORIES AND AVERAGES PER TON OF BEET WORKED.*

	Total		Per ton of beet	
	1933-4	1934-5	1933-4	1934-5
	£	£	s. d.	s. d.
INCOME, EXPENDITURE AND PROFITS:				
Net income from sugar (less Excise Duty) ..	5,139,357	6,358,985	31 2	31 1
Molasses ..	118,444	107,564	0 8	0 6
Pulp ..	893,066	1,231,576	5 5	6 0
Lime sludge ..	1,397	1,229	—	—
Total income from saleable products ..	6,152,264	7,699,354	37 3	37 7

* The figures are based on the confidential trading and profit and loss accounts of all the companies.

BEET SUGAR INDUSTRY

TABLE III.—*continued.*

Brought forward.	Total		Per ton of beet	
	1933-4	1934-5	1933-4	1934-5
	£	£	s. d.	s. d.
<i>Add subsidy†</i>	6,152,264 3,487,107	7,699,354 4,509,488	37 3 21 2	37 7 22 0
Total income	9,639,371	12,208,842	58 5	59 7
<i>Less cost of beets</i>	6,527,527	8,342,966	39 7 (68%)	40 9 (68%)
Balance to factories ..	3,111,844	3,865,876	18 10 (32%)	18 10 (32%)
<i>Less manufacturing costs and overhead charges</i>	1,970,393	2,303,104	11 11	11 3
Beet trading profit ..	1,141,451	1,562,772	6 11	7 7
Profit on subsidiary in- dustries	82,644	117,487	0 6	0 7
Total profit	1,224,095	1,680,259	7 5	8 2
APPROPRIATIONS OF PROFITS :				
Interest charges (net) ..	98,961	132,525	0 7	0 2
Directors' fees	28,753	36,749	0 2	0 2
Depreciation	324,814	354,978	2 0	1 9
Income tax	163,269	236,093	1 0	1 2
Dividends	370,392	513,762	2 3	2 6
Reserved	163,406	281,657	1 0	1 4
Unappropriated balances‡	74,500	224,495	0 5	1 1
Total appropriations	1,224,095	1,680,259	7 5	8 2

† Including in 1933-4, £100,050 and in 1934-5, £83,247 advances under the British Sugar Industry (Assistance) Act, 1931, brought into account (see Note to Table I). Of the latter sum of £83,247, £28,574 was not in fact brought into the factories' profit and loss accounts, but was applied direct to general reserves; for the sake of convenience in the preparation of the above Table this sum has been included in the total of £83,247, and also in the figure of £281,657 for appropriations to reserves.

‡ After deducting £35,000 profit on sale of investments.

|| Including £1,360 special Directors' fees paid out of profit and loss balances.

§ Representing :—	1933-4	1934-5
Increases in credit balances	£52,610	£122,658
<i>Less</i> Decreases in credit balances	20,295	—
Decreases in debit balances	32,315 42,185	122,658 101,837
	£74,500	£224,495

A SUMMARY OF SOME CONTINENTAL DATA CONCERNING NATURAL MANURE

S. E. SCAMMELL, B.SC., P.A.S.I., A.A.I.

IN 1932, in the course of a year spent in the countries of Northern Europe for the purpose of studying the economic conditions of agriculture and forestry, it became apparent to the writer that the question of manure preservation had been examined in greater detail on the Continent than in this country. For his own use he summarized such data as he found available from experiments in Germany, Denmark and Holland, as to the preservation and application of natural manure, the composition of artificial farmyard manure, and the practice of green-manuring. The purpose of this paper is to present these data, however incomplete, not as a contribution in itself of any value, but as a record that may conceivably be of use to others who are considering the subject in greater detail.

The question of the preservation of natural manure is obviously of great interest in a district where the cattle are kept in stall twelve months in the year, as on the large arable farms of Northern Germany. From a cow of 1,000 lb. live-weight, giving 1,000 gal. of milk per annum, with a total litter consumption of about 2,600 lb. of straw (a) in the year, the annual production of manure (b) might be about :—

		Nitrogen	Phosphoric acid	Lime	Potash
		(lb.).	(lb.).	(lb.).	(lb.).
In dry matter	(3,400 lb.)	75 (c)	30	45	8
In liquid absorbed by					
straw	(10,400 lb.)	28 (d)	1	1	39
In liquid not absorbed ..	(17,800 lb.)	52	3	3	71
In litter ..	(2,600 lb.)	9 (c)	6	9	6
	(34,200 lb.)	164	40	58	124

(a) as a minimum sufficient for comfort (7 lb. per day).

(b) variations in ration and in composition of manure due to calving ignored.

(c) not readily lost.

(d) about 18 lb. fixed, remaining 10 lb. lost on drying.

CONTINENTAL DATA CONCERNING NATURAL MANURE

	<i>Nitrogen.</i>	<i>Phosphoric acid.</i>	<i>Lime.</i>	<i>Potash.</i>	<i>Total.</i>
Value per lb., say . .	3·25 <i>d.</i>	1·90 <i>d.</i>	0·15 <i>d.</i>	1·00 <i>d.</i>	
In dry matter,					
liquid absorbed,	<i>s. d.</i>	<i>s. d.</i>	<i>d.</i>	<i>s. d.</i>	<i>s. d.</i>
and straw . .	27 7*	5 10	8	4 5	38 6
In liquid not absorbed	14 1	— 6	—	5 11	20 6
	41 8	6 4	8	10 4	59 0

Manurial value of straw, 3*s.* 6*d.* per ton.

Residual value of feeding stuffs, 14*d.* per 100 lb. Starch Equivalent.

Cost of 2,600 lb. wheat-straw at 25*s.* per ton, 29*s.* 1*d.*

* 2*s.* 8*d.* lost on drying.

Of Danish farms, 80 per cent. now have liquid manure tanks. It appears probable that, without a tank and with ordinary littering, the nitrogen in the liquid manure, amounting to about one-half of the total nitrogen, is an almost total loss. Even were this not so, the cost of the extra litter and labour, and the increased bulk, would render storage of the liquid manure more economical; while to fix the whole of the liquid manure is impracticable, and some loss through drying is therefore inevitable. The liquid manure tank, on large farms with an electric pump, is well established throughout Scandinavia and Northern Germany, even also in the grazing districts of Holland where cattle are in stall for only five months in the year. Attention has turned to the more efficient preservation of the solid manure. As against the 80 per cent. of farms that have a liquid manure tank, only 8 per cent. have a covered dung-heap. The cemented dung-pit, constructed over and draining into the liquid-manure tank, is still found more often on the grass farms of Friesland than in the purely arable areas of Brandenburg where it is most needed.

The argument for the manure tank as a means of preserving the unabsorbed liquid may be set out in figures. To absorb the unabsorbed liquid would require an addition of at least 40 cwt. of straw, costing (at 25*s.* per ton) 50*s.*, against which its manurial value is only 7*s.*,† giving a loss of 43*s.*, per cow per annum in addition to the loss of nitrogen; 34 lb. of nitrogen are fixed, but the remaining 18 lb., worth

† The mechanical value cannot be advantageously assessed.

CONTINENTAL DATA CONCERNING NATURAL MANURE

4s. 10*d.*, are lost on drying. With a liquid-manure tank, experiments have shown a loss of nitrogen of about 10 per cent. i.e., 5·2 lb., worth 1s. 5*d.* Thus, the greater loss, where there is no tank, may amount to 3s. 5*d.* plus 43s. outlay on straw. It may be argued that the loss of non-fixed nitrogen may be only partial, thus modifying these figures ; or that, in arable districts without a market for straw, it is desirable to utilize in dung the fertilizing qualities of the largest possible quantity, and that the straw has no other value. In such districts abroad, however, there has often sprung up an industrial demand, as in the case of the straw-carton factories in the Dutch peat provinces, and although, perhaps, this cannot be looked for in this country, farmyard manure is no longer the sole method of utilizing the fertilizing elements of straw. It is possible, also, that the German method of threshing in the field and ploughing in the straw might be practicable on some soils. Thus, this method burdens the production of manure with an expense equal either to the market price less the manurial value of the straw, or, at the least, to the cost of the extra labour involved—in addition to which we have the extra loss of nitrogen.

The alternative is to make no attempt to retain the elements of the unabsorbed liquid, showing a loss of 14s. 1*d.*

This may be summarized :—

						s.	d.
(a) Unabsorbed liquid lost.	Net loss	..	..	..		14	1
(b) Liquid absorbed—					s.	d.	
	Loss of nitrogen	..	..	..	4	10	
	Extra labour at 9 <i>d.</i> per ton manure	..	..	..	7	6	
	Cost of straw at 25s. per ton	..	..	..	50	0	
					62	4	
	Less manurial value of straw	..	..	..	7	0	
	Net loss	..	..	..	..	55	4
(c) Urine tank, net loss	..	..	..	..	..	1	5
Extra loss of (a) over (c)	..	..	..	..	..	12	8
	(b) over (c)	..	..	..	..	53	11
	(b) over (c) presuming straw value— less beyond manurial value	..	..	..	..	10	11
	As last, for six months period only	..	..	..	..	5	6

The charges (interest and maintenance) on the urine tank are usually negligible.

CONTINENTAL DATA CONCERNING NATURAL MANURE

The covered dung-heap has been found to reduce the loss of nitrogen in storage by about one-third. Even better results are claimed for the German "controlled fermentation" method producing *Edelmist* (Improved Manure). The manure is stored in boarded pens and kept covered with boards. The compartments are filled to a height of about 3 ft. according as the manure is short or long. A second layer is commenced after 3-6 days, the latter period in cold weather or if the manure is of a cold nature. In this period—usually in two days—fermentation will have raised the temperature to 60° C. The manure is kept compact by treading down, and at this temperature ærobic action soon exhausts the oxygen present. The falling temperature should be kept at 40-50° C. as long as possible. A third layer is usually added, and for the sake of compactness the final height should not be less than 10 ft. At the commencement the water-content should be about 75 per cent.; excess will result in a sour peaty formation, while, if it is too dry, the manure will become mouldy. A short dung, with only slight smell, free from fertile weed-seeds, and with a minimum loss of nitrogen, has been obtained by this method, cutting almost like silage. The area of ground necessary for the storage is considerably smaller than in the usual method. It is claimed that its slight smell permits the use of the manure on intensive pasture during grazing. After four months, in a stack 12 ft. high, a nitrogen content of 0.60 per cent. was obtained,* as against 0.43 per cent. in a stack 6 ft. high, and 0.35 per cent. in ordinary dung; the nitrogen content was thus rather high throughout, and such figures must inevitably vary widely, but in this case there was a saving, per cow per annum, of: 50 lb. nitrogen at 3.25*d.*, 13*s.* 6*d.*; or 1*s.* 6*d.* per ton of manure. The cost of the extra labour and the maintenance of the boards was estimated at 10½*d.* per ton of manure, leaving a gain of 7½*d.* per ton. The labour is increased to almost four times that necessary for ordinary dung.

A crop of potatoes, treated with dressings of ordinary manure and of *Edelmist*, showed a yield, for normal dressings, greater in the latter case by about

* 0.6 per cent. nitrogen, 0.2 per cent. phosphoric acid, 0.1 per cent. potash, 0.1 per cent. lime.

CONTINENTAL DATA CONCERNING NATURAL MANURE

1 per cent. for each ton of dressing to the acre. The gain was evaluated as follows, for each ton dressing per acre :—

(The Edelmist suffered a loss of weight of only 20 per cent. during storage, as against 40 per cent., so that 1 ton derived from 1·25 and 1·67 tons respectively)—

2 cwt. potatoes, say	24·00 <i>d.</i>
Less : labour on 1·25 tons Edelmist at 1 <i>s.</i> 2 <i>d.</i>	17·50 <i>d.</i>
labour on 1·67 tons manure at 3½ <i>d.</i> ..	5·83 <i>d.</i>
	11·67 <i>d.</i>
	12·33 <i>d.</i>
Add : value of Edelmist deriving from 1·67—	
1·25, i.e. 0·42 tons of manure ; i.e., 0·336	
tons at, say, 4 <i>s.</i> 6 <i>d.</i>	18·14 <i>d.</i>
	30·47 <i>d.</i>

This experiment proved little but the fact that, with some crops, where the point of optimum dunging is not usually reached, and the farmer is not accustomed to make large outlays on artificial fertilizers, an improved nitrogen-content in the dung can lead to startling results. Experiments with roots showed that the best results were obtained with a dressing of 9 tons Edelmist to the acre, and that these results were superior to those given by a dressing of 18 tons of ordinary dung. This result is in accordance with the nitrogen-content comparison. For other crops the best dressing appeared to be about 6–7 tons.

From the German Edelmist experiments it appears that the loss of nitrogen in dung stored in an open dung-heap is greater than was previously supposed, and may commonly amount to 20 per cent. of the nitrogen in the solid manure and (with the minimum litter, in this case 2,600 lb.) 90 per cent. of that in the urine. Finally it is possible to make a comparison for the cow first mentioned, (a) with uncovered dung-heap only, (b) with tank and Edelmist :—

	<i>s.</i>	<i>d.</i>
(a) Value of manure.. .. .	59	0
	<i>s.</i>	<i>d.</i>
Loss of free liquid	20	6
Nitrogen absorbed but not fixed	2	8
	23	2
	35	10

CONTINENTAL DATA CONCERNING NATURAL MANURE

(b) Value of manure.. .. .	59	0
Loss of 10 per cent of total nitrogen.. .. .	4	2
	54	10

Difference, (b) less (a)	19	0
Less extra labour to Edelmist at 10 $\frac{1}{2}$ d. per ton	6	5
Net gain per cow	12	7

As for last six months period only.. .. . 6 3

Loss of nitrogen in dung can arise either during storage or during application. Dung applied to arable land, already spread or in small heaps, is often left for any period from a few hours to several days before ploughing in. The loss, though presumably less where the dung is left in large heaps of 2-2 $\frac{1}{2}$ cwt., is in all cases considerable. Experiments carried out in Germany on barley and swedes show a remarkably constant proportion between the amount of dung and the yield. Reduced to units of the dunged crop the figures were :—

	Barley (A)	Barley (B)	Roots
No dung	71	78	76
Dung ploughed in at once (half dressing only)	86	88	88
As last, whole dressing	100	100	100
Ploughed in after 6 hr.	98	97	97
1 day.. .. .	86	94	94
4 days	85	86	86

The figures for Barley A were obtained in mild, damp weather.

It appears that the extra loss of nitrogen amounted in 6 hours to 7-14 per cent., in one day to 20 per cent., and in four days to 52-60 per cent. In warm damp weather, or on light soils, a loss of 50 per cent. may result from a delay of only 24 hours. It is easily seen, therefore, that the most careful storage methods are useless without due care in the application of the manure. The experiment shows, with special clarity, the indirect and much larger loss suffered by the farmer who, ignoring the low nitrogen-content of the manure which he applies, permits an insufficiently manured crop to occupy the land.

On the large arable farms of North Germany, producing corn and potatoes in conjunction with distillery, and utilizing waste materials for the production of milk and beef, the large quantity of straw used for

CONTINENTAL DATA CONCERNING NATURAL MANURE

clamping the potato crop and fodder roots renders the conversion of such old straw into manure of considerable importance. The most common methods of utilizing the fertilizing elements in straw and similar substances fall under three heads :—

- (I) The fermentation of straw and threshing offals with the aid of water and artificial manures.
- (II) The fermentation of straw, threshing offals, and potato-haulm with the aid of urine.
- (III) Compost.

The first method is similar in principle to that used in the production of Adco manure, by wetting straw in a solution of lime and an ammonium salt. Ten tons of straw (about 85 per cent. dry matter) are spread over an area about 5 yd. square and trodden down. About 2,200 gal. of water are added, then 220 lb. of basic slag and 200–260 lb. of nitrogen in solution, preferably with urine, and finally 3,300 gal. of water. Other layers are added after intervals of 3–6 days, to raise the height finally to 10–13 ft. A corner, boarded off against a wall, preferably cement-rendered and on ground level or sloping inwards to the corner, is favourable; a gully is formed round the open sides to lead off any escaping liquid to the urine tank. In the absence of a tank, a compost heap often receives the flow from both dung-heap and straw-heap. To facilitate fermentation the heap is often based on 18 in. of dung, when the fertilizers added to the first layer of straw are reduced by 25 per cent.

In the second method, to the 10 tons of straw are added 5,500 gal. of urine ; three further such layers are deposited, without interval, and the whole is then compressed and covered over. In a few days, fermentation will have reached a temperature of 55–60° C. ; the pile is kept moist, and in cold weather a little fresh horse-dung can be added. A second storey of four layers is then added and compressed, and the whole covered with earth, having a final height of 10–13 ft. Potato-haulms are damped, unless they are green, and diluted urine is usually added. If used on pasture, the half-rotted straw is spread in the autumn, and the remainder harrowed away in the spring.

On a superficial view, it is hard to believe that either of these methods, in the hands of the ordinary farmer,

CONTINENTAL DATA CONCERNING NATURAL MANURE

can show an economic return for the fertilizers or urine expended.

The formation of compost does not differ widely from the usual practice. The heap is about 3 ft. high, under shade, on a base of peat or turf. It is formed of alternate layers of earth and green-stuff, each about 6 in. deep, the whole kept covered with earth. In late spring and in autumn lime is added, and the heap turned and mixed. Urine may be added, both to keep the heap damp and to hasten decomposition ; this is usually done in early winter or early summer, when the action of lime is exhausted. In the same way, where peat litter is used, no peat is added for some weeks after the application of the lime. With calcareous soils, lime may not be necessary. The heap is often planted with bulk-producing plants, as a protection against rain and sun. The compost is used after two or three years or even longer, according to the decomposition of the green-stuff. It should be of a crumbling consistency, sufficiently dry not to stick to the shovel. Despite the danger from weed-seeds, it is frequently used on pasture at the rate of about 10 tons per acre.

Green-manuring is extensively practised on some soils of Northern Germany. On 11·6 per cent. of the arable land in Brandenburg, as against 20 per cent. in the southern provinces, green-manuring is included in the rotation. The various lupins, peas, and occasionally serradella and lucerne, are the most usual crops ; mustard, buck-wheat, and vetches are used to a lesser extent. After winter barley or early rye, a catch-crop of lupins and pulse may be taken on the better soils where water is not short. Scarlet clover and Bokhara clover or yellow melilot are also used in catch-crop mixtures. Catch-crops are usually drilled between the widely-spaced rows of sheaves ; or if winter wheat cannot be grown and rye is late, making a catch-crop difficult, serradella (on sandy soil), lucerne, trefoil and various clovers are sown under a thin corn crop (winter rye sown at 1 cwt. per acre, summer corn rather less). Serradella, at the rate of 40–50 lb. per acre, is not sown until the end of April, so that harrowing-in is usually impossible. Where the green crop occupies the land for a year, a mixture of blue, white and yellow lupins is usually sown, often

CONTINENTAL DATA CONCERNING NATURAL MANURE

with pulse or vetches; in which instance, there will also be a yield of pulse for fodder. On heavy ground, the green-manuring is usually followed by roots, on light land, by potatoes; or, if corn, rye or oats are usually chosen. Potash and phosphate are given to the preceding crops, usually in the form of kainit and basic slag; occasionally, potash is ploughed in before sowing. The addition of potash to the soil, often already slightly sour, necessitates liming every 6–8 years, usually in the form of 7 cwt. of ground lime; heavier liming is unfavourable to the growth of lupins. Lupin mixtures produce about 125–160 lb. nitrogen per acre, or grey peas 160–195 lb. If the ground is not clean, and is not quickly covered by the green crop, there is often trouble from couch, especially when the preceding crop was a thin corn-crop. For this reason in Germany a mixture is preferred, e.g., (per cent.) :—

25 grey peas, 25 beans, 40 vetch, 10 rape, or
25 grey peas, 25 white lupin, 50 vetch; or
25 grey peas, 50 white lupin, 25 vetch,
sown at the rate of 210–260 lb. per acre.

THE FIRST 18TH CENTURY ENGLISH BOOK ON CATTLE

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RICHARD BRADLEY, F.R.S., the author of the first 18th century English book on cattle,¹ obtained the post of Professor of Botany at Cambridge in 1720 by means of chicane and would have been put out of it for his scandalous behaviour had he not died opportunely some twelve years later.² The story goes that he pretended to have a verbal recommendation from Dr. William Sherard to Dr. William Bentley, and that he supported this with the further pretence that he would found a public botanic garden at the University out of his private purse, supplemented by funds that his interest would enable him to raise.

This alone is curious enough, especially when we recall that his complete ignorance of the classical languages gave great scandal in an age when there was little or no other basis for learning, especially academic learning; but beyond his criminal pretences and his ignorance of what was fundamental in the notions of his colleagues, he failed to deliver the necessary lectures, and Dr. Martyn, who succeeded him after his death, had to undertake this part of his work during his life.

Besides these reasons for dubiety we should to-day be likely to regard with some suspicion a book on the breeding, care and maintenance of domestic cattle, if it should appear over the name of a Professor of Botany. In the early 18th century people were less scrupulous and sciences were less watertight, but perhaps, if we consider the facts, we should consider Bradley rather in the light of a well-informed journalist than a really academic person.

¹ *The gentleman and farmer's guide for the increase and improvement of cattle* . . . 1729.

² Cf. D. N. B.: John Donaldson, *Agricultural Biography*, 1854. Donald McDonald: *Agricultural Writers*, 1200-1800, 1908.

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In spite of all this, Bradley's books—and they were both numerous and voluminous—secured a wide circulation in his own day, and a good deal of approbation from those who came after him. Only two of his works were listed in the British Museum catalogue in 1854, while to-day there are nearly thirty, and it is possible that more may come to light, because no two lists of his writings agree.

Of the two works to be found in the National Library in 1854 one was the book on cattle, and this received no mean encomium from Donaldson, who based his appreciation on the quality of the book as well as upon its priority of appearance. Earlier writers were voluminous but disjointed, and their remarks and instructions on particular subjects have to be mined out of a mass of general matter expressed in the most diffuse manner, so that the reader who wants to come to the heart of the matter as far as they are concerned is confronted with a task that would daunt the audacious. Bradley introduced a more methodical arrangement into his treatise and thus provided a readiness of access to his ideas that was as welcome as it was unfamiliar to his readers. McDonald also feels that he has this merit. Bradley was evidently a man of orderly mind, and, although much of the contents of his books was culled from earlier writers, rather than from the field of personal experience to which he attributed his teachings, yet he was the first to provide the very necessary concentration upon essentials. Moreover, he was lucky in his efforts, because the appearance of his works coincided most opportunely with the growing love of farming and gardening, and it is certain that his works (in spite of his personal idiosyncrasies) helped to improve both.

The more orderly presentation of the matter that had previously been published on cattle, in the numerous didactic works of the 16th and 17th centuries, would have been of value, but Bradley's book on cattle does not consist only in this. It also provides us with a good deal of information that he had culled from his acquaintance in the farming community, and we may assume that his circle of familiars was fairly wide.

The book is divided into four chapters, themselves



FIG. 1. 'Neat' or 'Black' cattle. (From Richard Bradley's *The Gentleman and Farmer's Guide*, 1729.)



FIG. 2. Shepherding, showing common type of sheep. (From Richard Bradley's *The Gentleman and Farmer's Guide*, 1729.)

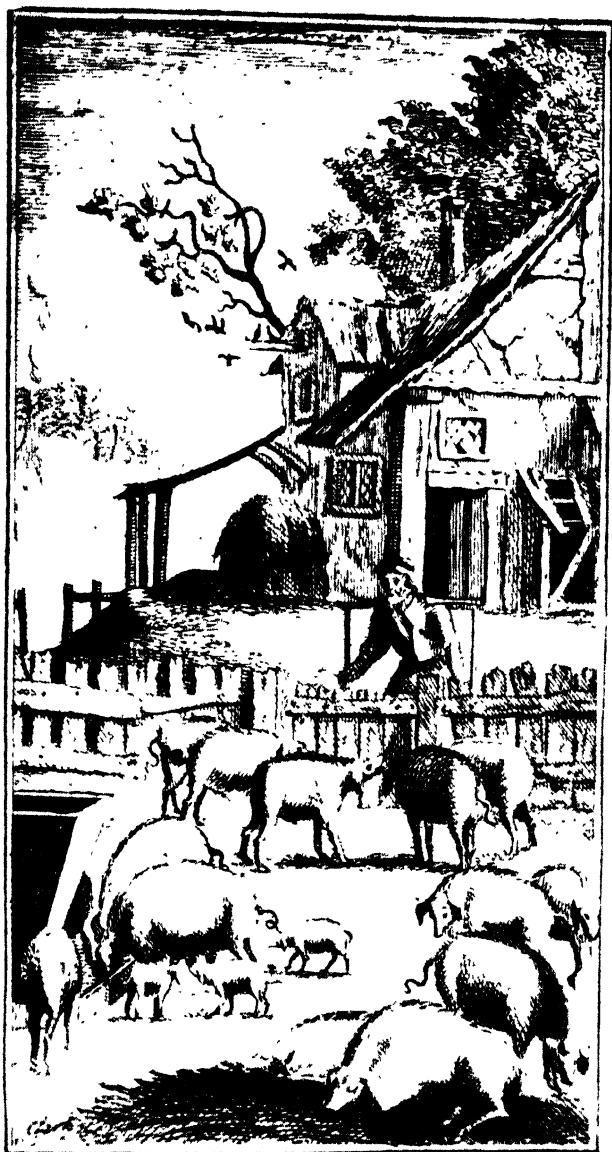


FIG. 3. Pigs, showing the undeveloped type of the period. (From Richard Bradley's *The Gentleman and Farmer's Guide*, 1729.)

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split up into sections, each chapter dealing with a particular type of livestock, i.e., sheep, pigs, cattle, horses, a sufficiently obvious orientation. Probably a good deal of the chapter on sheep was assimilated by Wm. Ellis and reproduced in his book on sheep;³ Bradley fails to mention farm horses in the last chapter,⁴ so that we need say very little about these chapters here.

The order in which Bradley treats the beasts of the field is a trifle curious to the modern, but it must be remembered that, as he himself says, in his day the sheep was the most important domestic animal. His own words are "The Sheep being a Creature of extraordinary Profit to *Britain*, from the riches which proceed from its Wool, and the great Convenience arising to the Generality from its nourishing Flesh, its Tallow and its Skin, I think it proper to give it the Preference in this *Treatise*." All this was very true. The whole agricultural question had revolved around the grazing of sheep for some two centuries, but it was the wool more than anything else that played an important part in the field of politics. The sheep was, however, a universal factor in farming; it played no less a part in the arable counties than it did in the mountains and heaths of the north and west.

Bradley gives the usual instructions to buy sheep from poorer pastures for finishing, and he places some emphasis on the then new system of breeding that enabled the public to have lamb on their tables at any time of the year. The public for his purposes was of course the richer people in London.

He indicates that the system was only some twenty years old, and that it was originated by Sir John D'Oyley, "a very curious Gentleman of *Oxfordshire*." His method was in the main to depend upon putting the sheep in different pastures, the richest bringing the ewes to "blossom" sooner than the poorer, so that he obtained a sequence of lambs rather than getting them all dropped at approximately the same time of the year. One essential was to keep the rams apart from the ewes except when their presence was necessary.

³ Cf. G. E. Fussell, *The first English book on Sheep*: This JOURNAL, Aug., 1933.

⁴ Cf. Ernle, *English Farming Past and Present*, 1927, p. 183.

At that period it was the common practice to milk ewes, especially in Wales where ewe's milk was often mixed with cow's milk for the making of cheese. It has, indeed, been said that some of the famous Cheshire cheese was made from mixed milk of this type. Bradley did not, however, approve of milking ewes. It was to his mind an ill husbandry, because it was more profitable to have a lamb by the side of a ewe, and he thought that milking injured the wool as well as keeping them from the "blossom." He also recommended breeding from twins in the hope that this genetical factor would be reproduced.

He sets forth the characteristics of a good ram : ". . . his Eyes must be full and ruddy, his Ears large, his Shoulders, Breast and Haunches broad, his Testicks large, and his Tail broad and long, and his Fleece, as well as that of the Ewe, white, deep, greasy, and close. As for black Sheep they are not to be chosen for two Reasons; in the first Place their Flesh is coarse, and ill tasted, and their Wool, though it is Black, will change red and of an ugly colour when it is wrought, and comes to be exposed to the air" He prefers the nodd to the horned varieties. Another thing he says is worthy of record. ' He dislikes the idea of letting the whole flock run together and is emphatic upon the point that the different classes of animal should be kept apart. Fattening stock, ewes, wethers and threaves and lambs should each be kept separately. The wethers and rams in particular should be kept by themselves, " for else, the Strongest would hurt the Weakest, and not suffer them to pick the Food which might be the most nourishing to them. "

On the subject of shearing he has little to add to the current knowledge. Here he frankly quotes Fitzherbert,⁵ even going so far as to print his citation in Black Letter to give it more precision, and, as Fitzherbert was a writer of two centuries before Bradley, we may perhaps safely assume that little or no change had taken place in that process of the exploitation of the sheep.

Bradley's reason for putting his chapter on pigs next, is because the pig is " a Creature kept with little Trouble and profitable in every part of it. "

⁵ *The Booke of Husbandry*, 1523.

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Moreover, "Swine are the chief Support of the Kitchen; and on the other Hand, the Kitchen is a great Support to the Swine," a proposition perhaps of more literary than farming merit, or at least one in the first part of which a modern farmer would put more trust than the second. Kitchen swill, although pigs will eat it, is not nowadays regarded as the best balanced ration for the animal.⁶

His opinion of the best breed is more familiar to modern ears. There was then a very large pig known to some as the Hertfordshire breed and to others as the Lincolnshire, and the other main breed known generally as the Black breed, but under other names also. The cross between these two breeds was Bradley's ideal. They had the three good qualities of being very fecund, of being more hardy and easy to fatten than the large sort, and of yielding a finer and more delicate meat. The first was a long-legged, long-sided beast with a long thick neck and carrying long bristles; it was often 12 or 13 hands high. The second was very deep-sided and bellied, with thick gammons and short legs, and usually about 8 hands high. The cross was of a medium between the two and of various colours and markings, with an average height of 10 hands.

The large breed he recommends should only be kept in places where there was plenty of mast and large quantities of peas, although barley meal or sodden meal was a good fattening food. This breed should be used for bacon. The Blacks and the cross bred could be kept on the stubbles, where they would thrive until almost fit for the butcher as porkers. Leicester and Northampton were noted for fat hogs made into bacon because large quantities of peas and beans were grown in these counties as a normal part of the rotation, and used for pig feeding. The dairy districts were also considered very good for keeping pigs because they could be fed on the offals of the dairy, skim-milk, butter-milk and whey.

Bradley also attacks the current opinion—still held

⁶ Cf. Brynmor Thomas and J. Hargreave: *The composition of kitchen waste*. This JOURNAL, 38, 1931, p. 366 ff.; *ibid.*: *The composition and feeding value of pig swill, Fertiliser and Feeding Stuffs Jour.* Oct. 11, 1933, p. 359.

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in some quarters—that the pig is an animal that flourishes best in dirt and filth, and he brings very modern arguments to bear in support of his contention. In pig breeding, Bradley reckoned that matters should be arranged for the sows to farrow in the late spring and summer months, so that the young could be killed as sucking pig or put into the stubbles in the autumn. He also believed in feeding the mother plentifully both just before and for some time after she had farrowed in order to prevent the sow eating her young and to enable her to keep them plentifully. The boar should be gelded and fattened when past his fifth year, and the sow allowed to breed till she is six, but he thought that the best bacon or pork was obtained from an animal killed at six months and certainly not more than nine months old.

The general instructions for feeding are not so very different from modern ideas, although the same variety of materials for making up the ration was not then available. Allowing for this, Bradley's ideas are sufficiently modern in spite of their empiricism. Instructions for curing green and smoked bacon and for salting pork are included in his medley of information. An interesting idea he puts forward is a hopper for pig feed that will allow the animals to get all they can eat without spoiling any.

In entering upon the subject of Cattle, Bradley thinks it necessary to quote the classical authorities, possibly mainly with the idea of confirming his learning, although we must remember that classical authority was considered the final arbiter in most subjects in his day. Following upon classical authority we are introduced to Fitzherbert's view, again printed in *Black Letter* to give a true atmosphere of exact citation.

The classification of cattle is simple. "Lincolnshire, and Somersetshire, are both noted for the production of large Beasts, generally of the Red Colour, or a Cross-strain, between them and the Black. In some parts of Surrey, we meet with the White Sort, which being cross-strained with either of the other, produce Pyed Cattle. It is reported that the White Sort produce the richest Milk, and then their Flesh more readily receives Salt, than any of the other.

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The last phrase is a commentary on contemporary methods of meat preservation. Heifers were not to be bulled until they were three years old, and the bull before undertaking his life's work must be well fed with grass, chaff or hay, and kept by himself. It was then the common practice to arrange for calves to be dropped in March or April, but Bradley thought that any time from Spring to Winter was right for service in order to have a succession of cows in milk.

A curiosity in modern England, but not on the Continent, is to train up heifers to draught work. Bradley does not disagree with this practice, but thinks the heifers should be spayed, and that if they are well fed after labour they will yield as good profit at market as a highly prized bullock. This statement was made on the authority of a farmer of Gloucestershire, who made the record price of £15 for one. He then enters upon the current discussion whether cattle or horses are best for draught, and concludes that an injured beast can be sold to the butcher whereas a dead horse is just a dead horse. The black breed are in his opinion the best for labour and the red for size and rich milk. It was only near the big towns like London that liquid milk could then be sold in quantity; districts more distant from centres of population were obliged to make butter and cheese.

In Essex and Hertfordshire another profitable line of business was the feeding of calves for veal for the London market. For this the calves were kept in pens raised off the ground and very regularly supplied with their milk, into which a little scraped chalk was sometimes mixed. Moreover, they were bled frequently in order to make their flesh white. In reality Bradley was not at all sure that all this ceremoniousness made the veal any better than that of a calf of six weeks old, that had been well suckled and kept in a cool place.

Since the liquid milk business was so limited at that time it is not surprising to find in Bradley's work extensive instructions for the making of cheese. He begins with the famous Stilton, goes on to Angelot, and then comes to the more usual Cheshire and Cheddar types. Cream cheese and various other types are also described. In this connexion he points out that when a cow first goes to grass in April, 12

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quarts a day Winchester measure is good milking and that this is equal to 4 pints of cream or 2 lb. butter. Instructions for making butter according to the recipes of the different counties famous for this product naturally follow, and the whole is completed by yet another Black Letter citation from Fitzherbert.

A commentary on the farming of the day is provided in Bradley's remarks about the tractability of young steers intended to be broken in as oxen. Those from the Forest or Common are usually wild and have to be handled carefully; those from inclosed countries, having been accustomed to human contact from their earliest days, are more readily managed. When he comes to discuss the feeding of oxen Bradley opens with a long citation from a "Learned Nobleman of Germany, *Conrade Heresbatch*,"⁷ who was another writer of Tudor times; his discussions of the uses of the parts of cattle is, although of course much briefer, almost as comprehensive as the textbook that deals with the modern aspects of the subject.⁸ Nothing is waste!

The whole section on cattle is completed by a very lengthy exegesis on diseases, as indeed are the earlier chapters and the following one on horses. That on cattle diseases is more interspersed with quotations from Fitzherbert's work than the rest of the book, and the recurrence of Gothic type is a tiny shock to the eye.

Turning to horses Bradley distinguishes breeds, but tells us very little about methods of breeding. The major portion of this chapter is devoted to equine diseases, but the preliminary discussion is not uninteresting. The True-bred English horse no longer existed, Bradley proclaims, even in those districts where they ran wild as in some of the forests and mountains. These had to be captured and tamed, and were then very enduring in their work. Most of the discussion is, however, about foreign breeds, the Hungarian, the Turkish and so on; the only indication that any district was devoted to horsebreeding is the remark that the Northamptonshire breed is good for the draught both for the coach and the cart. Apropos

⁷ *Four bookes of Husbandry*: Tr. by Barnaby Googe, 1577.

⁸ Cf. Rudolf A. Clemen: *By-products in the packing industry*, 1927.

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of breaking for riding, a purpose on which most emphasis is laid, Bradley mentions the authority of the Duke of Newcastle,⁹ a famous contemporary authority on what was then known as cavalerie, and it is not altogether unjust to suspect that this part of the book is largely, if not wholly, compilation.

Some fear may, indeed, be felt that most of the book is of this character, but its author has the virtue, uncommon in his day, of acknowledging some part of his borrowings. Whether it is just to think that, because he was able to cite writers of an earlier day, practice had remained static since that time is another matter, especially when we remember that the classic writers are mentioned with respect. It is, however, possible that little change in the general methods of managing farm animals had taken place in the two centuries between his day and that of Fitzherbert, but that enterprising spirits up and down the country had introduced novelties from time to time with the varying success that always attends such efforts. Much more research will be necessary before our knowledge of this point becomes precise.

Donaldson, as mentioned above, praises Bradley for arranging his material in a more orderly manner than his predecessors. This is true, but only in a degree. His chapters deal with separate subjects; within them there is much confusion and a good deal of irrelevant discussion. His work, however, is an advance over his predecessors, and, in spite of his cribbing and the almost certain fact that his knowledge was second-hand, the contemporary popularity of his writings shows quite definitely that they supplied a need and were found useful by practical men—which is sufficiently peculiar in view of their author's complete lack of what would be considered equipment, if judged by modern standards.

⁹ William Cavendish: *A new method and extraordinary invention to dress horses and work them according to nature*. French ed., 1657, Eng. 1667.

MOLE DRAINAGE DEMONSTRATIONS, 1924-1932

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BETWEEN February, 1924, and January, 1932, the Ministry of Agriculture, acting in conjunction with the Agricultural Education Committees of the local County Councils, carried out some 53 Mole Draining Demonstrations in 34 counties of England and Wales. In nearly all instances, the fields (with one exception grass land) drained at these demonstrations have been subsequently visited at intervals by the County Agricultural Organizer or his representative, who has reported to the Ministry his observations and the farmer's views on the condition of the land and the functioning of the drains. By courtesy of the Ministry, copies of these reports have been forwarded to the Institute for Research in Agricultural Engineering, members of whose staff assisted at a number of the demonstrations and, wherever possible, obtained records of the draught of the mole ploughs at work.

Accounts of the demonstrations held up to and including the season 1928-29, together with observations on the results of the work done, have already appeared in this JOURNAL.^{1*}

Reports on these demonstration sites are now being discontinued, and it was considered that some value might attach to a survey of the information that had been collected.

Since these drains have been laid down for periods ranging from 11 to 3 years, a study of their history throws considerable light on the question of the life of mole drains that have, for the most part, been drawn by direct tractor haulage and are comparatively shallow. While the demonstrations, as such,

* For references, see p. 1255.



Photo Dr H J Denham

FIG. 1 — Hendon Tractor Winch and Mole Plough

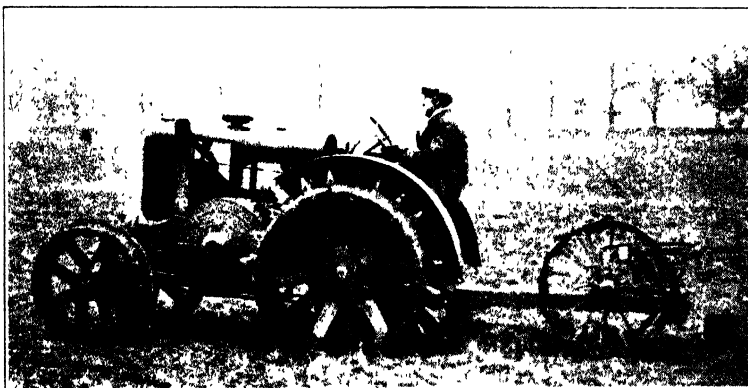


Photo Dr H J Denham

FIG. 2 — Marshall Tractor and Ransome Self lift Mole Plough



Photo R L Knight

FIG. 3 — Martin Self-lift Mole Plough drawn by "Caterpillar" Tractor

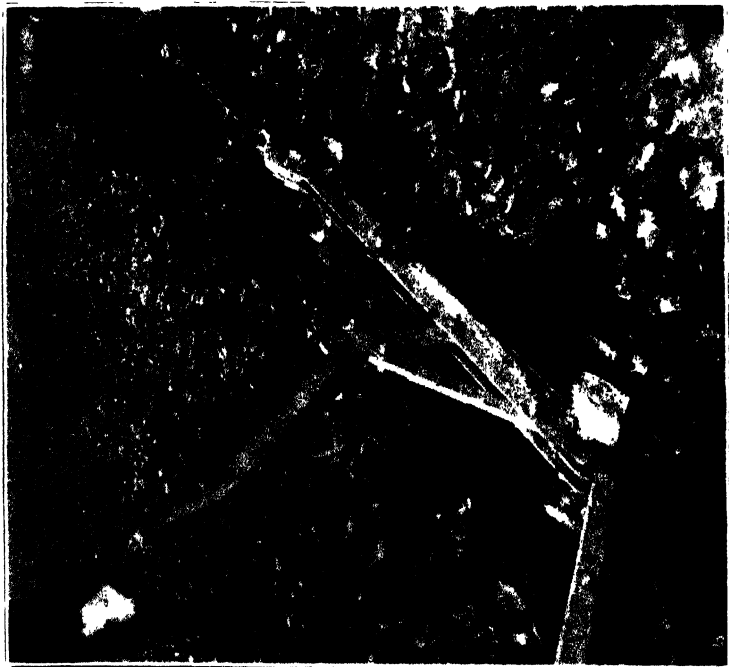


FIG 4 --Harper-Stedman Mole-Plough starting from eye-hole
above main dike

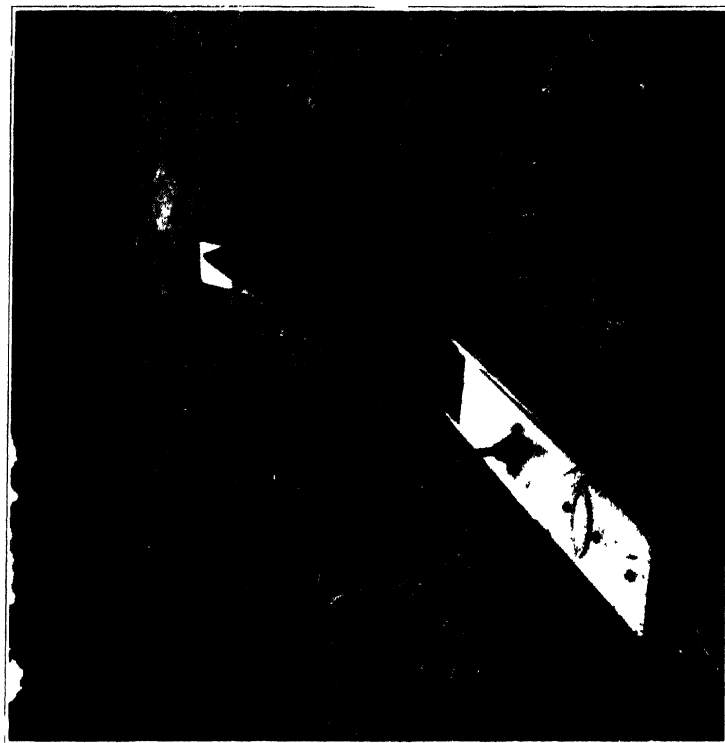


FIG. 5 The "Simplex" Excavator making first cut, 12 m deep
by 16 m wide

Courtesy of Mr E. V. Tuose.

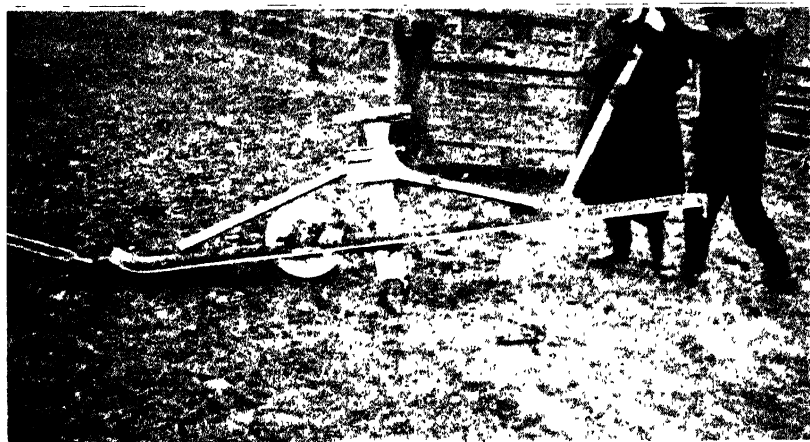
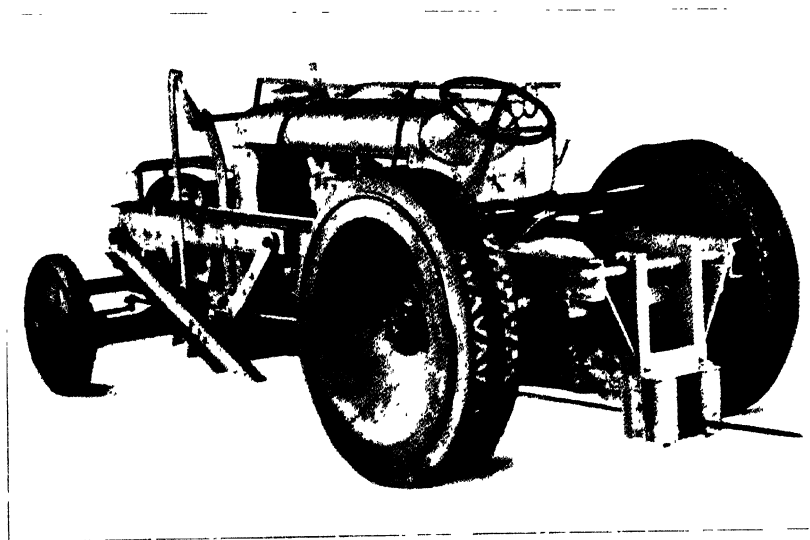


Photo by H. J. D. n. am

FIG. 6 Ransome Bean-Mole Plough entering the ground



Courtesy of Auto Mowers, Ltd

FIG. 7 Auto Mower Winch on Fordson Tractor

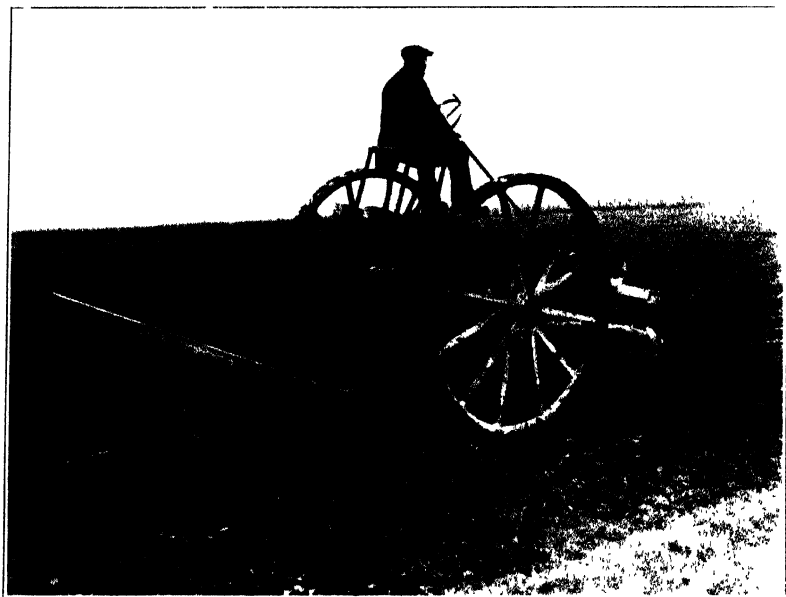


FIG. 8 Allen Steam Cable Mole Plough

Copyright



FIG. 9 --Case Track-laying Tractor with Darby Mole Plough entering
the ground

Photo Dr. H. J. Denham

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were very successful, it must be admitted that the results of the work done have not been uniformly satisfactory, but perhaps more can be learnt as to possible causes of deterioration from such a series of systems covering a fairly wide variety of conditions than from systems that have been carefully laid down and well looked after. It is of particular interest to consider the various causes to which failure or subsequent deterioration is attributed; they may serve to illustrate the possible pitfalls and to emphasize the factors that make for success in mole-draining generally and by direct tractor haulage in particular.

Scope.—The primary object of the demonstrations—this is a point that must be emphasized and borne in mind throughout—was to demonstrate as fully as possible the methods and equipment available for carrying out mole-drainage, including trench-excavating for main drains. These included, in many instances, the already well-known method of steam-cable haulage, but the demonstrations were primarily held to bring to the farmer's notice the newer methods and equipment by which he could possibly undertake the work himself at a comparatively low cost. For this reason the method of direct tractor haulage was much in evidence, and it is interesting to note that, at the first demonstrations in 1924, direct haulage was represented by one make of tractor and one make of mole plough, whereas, in 1932, it was demonstrated by no fewer than 8 tractors (3 of them wheel tractors, 5 of the track-laying type, 2 with Diesel engines and 1 with four-wheel drive) and nine mole ploughs (6 different makes). The method of cable-haulage by a horse-driven windlass was shown at the earliest demonstrations; this was followed by a portable engine-driven winch; and, in 1928, the first tractor-driven winch made its appearance, since when more than one make of this type of equipment has been demonstrated. These demonstrations have undoubtedly stimulated not only the practice of mole drainage, but also the manufacture of mole ploughs both of the light and heavier patterns, and have contributed to the development of improved patterns of mole plough.

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Methods of lay-out, of making the junctions between the main drains and the minor drains, of constructing outfalls, etc., could only be demonstrated, if at all, to a very limited extent.

Limitations.—Attention must be drawn to the limitations that the conditions of a public demonstration impose upon the work carried out, particularly as regards the “ quality ” of the drains themselves and of the system as a whole. In the first place, a public demonstration has to be arranged some time beforehand, and generally as part of a definite programme covering the winter months. The equipment assembled has to be shown at work on a particular day or days, whatever the conditions of the ground or weather, so the work may have to be carried out under unfavourable conditions such as would be avoided in ordinary farm practice. The field or fields in question are in need of draining or they would not have been chosen, and it is not unlikely that, on the date fixed, they are in a very waterlogged condition. It is true that, under these conditions, the drains run as soon as they are drawn and provide a spectacular illustration of their function of removing surplus water. The very wet conditions, however, not only mean that the field is considerably cut up but they make adhesion difficult for the tractors and this may lead to an easing of the draught by diminishing the depth at which the drains are drawn. It is not always possible to ensure that the ditches into which some of the drains are to empty have been adequately cleaned out before the demonstration, and this may cause flooding in the lower parts of the field and possible silting up of the drains. This may also prove unavoidable where a trench excavator is shown at work, for some of the drains may have no proper outlet until the trench is completed.

Again, a demonstration is only made possible by the co-operation of the various makers of tractors, mole ploughs and other equipment. Some mole ploughs undoubtedly do better work than others, particularly where sedges and coarse herbage are encountered—a point more fully dealt with elsewhere²—but all must be given a fair trial. The

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tractor drivers, where direct haulage is used, are anxious to show off the capabilities of their tractors, but few have any knowledge of what constitutes good mole-drainage, and they are inclined to carry out the work too fast, with little regard for what is going on behind them; they are also apt to manœuvre about in the field, regardless of crossing other drains already drawn. The public, too, are not blameless in the matter of damage at public demonstrations.

That these considerations are not negligible is shown by the fact that the failure of some drains, drawn at public demonstrations, to function satisfactorily has been attributed to the causes mentioned or can be put down definitely to the limitations discussed.

Neglect.—The most frequent cause of failure, however, is undoubtedly due to neglect on the part of the farmer on whose land the demonstration is held. The work done at the demonstration is confined to drawing the mole drains and excavating a trench for a main drain, and necessarily leaves a good deal to be done to render the work really effective and of lasting benefit, such as completing the main and constructing a proper outfall, fitting adequate outlet pipes to the mouths of the mole drains emptying into a ditch, and fencing these against stock. In some instances, little has been done since the demonstration, with the result that the system has rapidly deteriorated. Even where the work has been satisfactorily completed at the time, subsequent neglect to attend to the outlets and keep the ditches cleaned out has annulled the improvement brought about by the demonstration. It cannot be too strongly emphasized that where drains empty directly into a ditch, the outlets must be piped—and for this one length of ordinary tile is not enough, a 2- to 3-ft. length of glazed pipe or boiler tube is preferable. Further, the ditch must be kept cleaned out and preferably fenced against livestock. If these precautions are taken, there is no reason, on this score, why the drains should not work well, but if, as too often happens, they are neglected, the system fails and is then condemned.

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Cracking Open of Drain Slits.—Another cause to which deterioration is attributed is the cracking open in dry weather of the slits made by the blade of the mole plough, so that the soil crumbles and falls into the drain, and silting-up ensues. In one instance³ where the drains were drawn in January, the following March and early April were dry and the slits cracked open to a width of 3 in. at the surface, the drains being rendered quite useless. It is to be noted, however, that in other instances, cracking open has occurred but does not appear to have seriously affected the subsequent working of the drains. This was also the experience of this Institute with some mole drains drawn near Oxford, where the slits opened to a marked extent in two successive dry summers, but no significant harm was done. The only practicable method so far of minimizing this danger is to plough out a furrow first, draw the drain in the furrow and turn back the furrow over the drain. (Incidentally this provides a means of increasing the depth of the drain without correspondingly increasing the draught). If this expedient is tried, it must be noted that the width of the furrow needs to be wider than the beam of the mole plough. With direct haulage, it is not difficult to keep the beam in the furrow, but it is by no means so easy with cable haulage if the line of the drain is not straight.⁴ Alternatively, it is said that drawing two shallow slits on either side of the drain by means of two coulter on the mole plough minimizes the shrinkage around the drain slit, but the writer has not come across instances where this has been tried. Davies, in the note already mentioned, was satisfied that neither of these expedients would have mitigated the damage in the instance he mentions. The only alternative would appear to be to mole drain as early in the autumn as conditions permit, so as to take advantage of as much wet weather as possible to close the slits made.

Depth.—This danger of cracking open, also damage to the drains by moles, heavy transport, or the treading of livestock, which are mentioned in the reports studied, is more likely to cause deterioration

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where the drains are shallow. Shallowness, apart from the above-mentioned possibilities, is also stated to have caused deterioration in some instances, and the lack of adequate depth is ascribed, particularly in the case of the earlier demonstrations, to "lack of power," though this term is probably meant to cover difficulty of adhesion of the tractor wheels. The question of power and adhesion will be considered under "draught." As regards depth, the top of the drains should be at least 2 in. in the clay, and, generally speaking, the bottom of the drains not less than 15 in. below the ground level, though the opinion has been put forward in one of these reports that, where there was Gault clay, a depth of 10-12 in. would have been sufficient. Where drains of less than 15 in. depth, and others of 16-20 in. have been drawn at the same time, the deeper drains have proved the more satisfactory.

Sub-Soil.—It is not always possible to find in a district where a demonstration is desired a convenient field in which the sub-soil is entirely suitable for mole draining; and, in some instances, the fact that the sub-soil was not heavy enough, lacked homogeneity or contained stones, beds of shale, or an aggregate known locally as "black ram," has marred the satisfactory working of the drains. Davies³ has drawn attention to an instance of mole draining in a soil regarded locally as a heavy clay, which proved to be unsuitable, and recommends that, in borderline cases, advice be sought as to the suitability of the sub-soil before any work is undertaken or expense incurred.

Fall.—Too little fall has proved detrimental. With some types of mole plough it is, at least theoretically, possible to vary the depth of the cartridge as the mole plough travels along and thus the drain can be given an artificial fall, but the operation requires considerable skill, and, in the experience of one firm of drainage contractors, has not proved satisfactory, and they have abandoned it. With the simpler types of mole plough this is not possible. Where there is only slight fall, it is advisable to make a preliminary survey with a level, and to make the mole drains short by putting in additional mains.

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Length.—It is possible to make mole drains too long, particularly where they are less than 3 in. in diameter: 300 yards has in one case proved unsatisfactory; 10 chains is generally regarded as the maximum.

Speed.—It is regarded as an axiom of good mole drainage that the work should be carried out at a slow, steady speed. The faster the cartridge of the mole plough travels through the clay, the more likely it is to tear the walls of the drain. There is a danger, already mentioned, where a powerful tractor is used to haul the mole plough direct, of carrying out the work at too great a speed. It has been reported that, where a few drains were drawn at a speed of $3\frac{1}{2}$ –4 m.p.h., the drains after only 2 years were of very little use.

Directions.—As regards the drawing of drains downhill, no particulars are available on this point, and it is not specifically mentioned in the reports. One of several experimental mole drains, laid down near Oxford, was drawn downhill, and subsequent measurements of outflow have shown that this drain discharged less than other similar adjoining drains drawn uphill, which seems to show that more silting up had occurred. This also confirms observations made by Nicholson at Cambridge⁵ on plaster casts of mole drains.

Moles.—The action of moles along the lines of the drains appears to have been detrimental in some instances but not in others. Their action does not seem to extend below the top 6 in. of soil, or the depth of the top-soil above the clay.

Heavy Transport.—Damage to mole drains has been caused by the carting of dung in the winter, and by other heavy transport. This should be avoided if possible in the same season in which the drains have been drawn, and before the drains have had time to "set." The only safeguard against damage from this cause would appear to be in putting the drains at a minimum depth of 18 in.

Steam-Tackle.—Where steam-tackle has been used, the work done has been invariably satisfactory,

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but damage to the field by the engines has been reported in one instance to have lasted for 3 years. Here the work was probably done under softer conditions than would have been considered advisable on ordinary contract work.

Mains.—In some instances, a large mole drain has been drawn by cable haulage to serve as a main drain, but this has generally proved unsatisfactory, the junctions with the minors being at fault. The minor drains may have been drawn first, and it is probable that proper junctions were not made. The main should be drawn first, otherwise, in drawing the main, the blade of the mole plough will close up the mouths of the minors, and they will thus have no adequate outlet. Where the depth of the minor drains is carefully adjusted so that the mole drain just breaks the top of the mole-main the junctions have, in the experience of a firm of drainage contractors, proved satisfactory and the expense of opening up has been avoided. It is, however, not generally satisfactory merely to draw the mole drains haphazard across the main. Piercing the ground between the minors and the mains at the junctions should at least be done, though this may prove to be only temporarily effective. It is better to open up the junctions and ensure a free passage from the minors to the main. Covers over the junctions at or below the surface allow of subsequent examination and the junctions can be kept clear. Bush mains have been used in some cases but not always with success; in one instance, a main of this kind had fallen in at the end of 3 years. Old tile mains have been utilized; they have been opened up and bushed to the level of the minor drains and have proved very satisfactory.

Undoubtedly, the best main is a tile main, but this must be of adequate size; anything less than 4 in. in diameter is likely to prove inadequate. In one instance, deterioration of the system was ascribed to too small a main, which was only 2 in. in diameter.

The better sequence of operations is to lay the main first or at any rate excavate the necessary trench for it; the minor drains then have a free outlet as soon as they are drawn. It is certainly simpler to draw the minors

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first, but they will have no free outlet until the trench is excavated and may cause flooding, in addition to which the drains will probably be pinched by the excavator if one is used, though this can and should be immediately remedied.

One of the principal deterrents to the construction of a tile main is undoubtedly the cost of excavating the necessary trench—a factor that does not arise in a demonstration, where a trench is excavated as part of the programme—and there is remarkably little equipment available for trench excavating apart from costly contractors' tools. The only excavator of low cost on the market is cable-drawn and is a very useful aid in laying a tile main or for tile draining generally. It is not, however, very suitable for ditch cleaning, which would be an added advantage of great value.

Draught.—As already mentioned, records of the draught of the mole ploughs at work were obtained at quite a number of demonstrations. Owing to the many variables entering into these measurements, it has not been possible to draw more than general conclusions from them. Some typical figures have been published⁶ and some general conclusions put forward. The latter may perhaps be quoted here. "The draught of a mole plough depends on the depth and size of the cartridge and on the wetness of the sub-soil. The wetness of the sub-soil plays a far more important part in determining the pull than a difference of 2 in. or 3 in. in depth or $\frac{1}{2}$ in. in diameter of cartridge. For example, the pull of a mole plough with a $2\frac{1}{4}$ in. cartridge working 15 in. deep has been known to vary from as little as 1,500 lb. under wet conditions, which is equivalent to 8 h.p. at 2 m.p.h., up to 3,450 lb., equivalent to 18.6 h.p., under much drier conditions, which compares with a recorded pull of 3,630 lb., or 19.4 h.p. for a 3 in. cartridge working at a depth of $21\frac{1}{2}$ in. in thoroughly wet ground. The power required varies between very wide limits; our records for direct tractor haulage range from a pull of 1,390 lb., or 7.4 h.p. at 2 m.p.h., up to 4,350 lb. or 23.2 h.p. Broadly speaking, to draw mole drains at a depth of 15 in. and up to $2\frac{1}{2}$ in. diameter in a wet sub-soil requires up to about 14 drawbar h.p. Under

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drier conditions, the power required may be as much as 18 or 20 d.b.h.p. With tractors rated at 15–18 or more d.b.h.p. it is possible to draw mole drains deeper than 15 in. and up to 3 in. in diameter under most conditions.”

As already mentioned, the depth may be increased by drawing the drain in a previously ploughed-out furrow; an instance of this was given at the recent Mechanization Conference at Oxford. As deep a furrow as possible was first ploughed out; the mole plough was then drawn in the furrow by two tractors in tandem. In this way a depth of 18–20 in. was secured. The depth may also be increased by using a cable and one or more pulley blocks. This involves anchoring either one end of the cable or one of the pulley blocks, and this is rendered a more convenient operation by the use of a portable anchor, such as is made in 3 sizes, weighing from 36 to 77½ lb., by a Hampshire firm.

As regards adhesion of the tractor wheels, on good herbage, not excessively wet, a wheel tractor with strakes can usually succeed; but, where the herbage is bad or very wet, the wheels tend to pack and slip. Spuds are generally better than strakes. Track-laying tractors are for the most part more satisfactory than wheel tractors, but not all track-laying tractors are equally satisfactory. Light tractors fitted with tracks, having biters that are close together and not very deep, may have difficulty in getting a grip on soft ground.

Life.—The causes of deterioration in the drainage systems laid down at the demonstrations under review have been dealt with at some length, but it must not be assumed from this that the life of the drains has in all instances been short. That would be far from true. The deterioration in many cases has only occurred on part of the site drained, and then only after a number of years. Where cable haulage has been used, the results have been generally successful.

The results are set out as concisely as possible in Table 1, where a comparison is made between the actual life of the drains and the longest possible life they might have had. This latter figure is not neces-

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sarily to be reckoned as the period from the time of drainage up to the present season, for, in many instances, information is lacking after a number of years. The possible life is therefore taken as up to the time of the last report. All sites having the same "possible life" are grouped together irrespective of chronological order. In certain selected instances, where the last report showed the drainage to be still satisfactory, an endeavour has been made to secure up-to-date information, particularly in view of the recent dry summers, when cracking open of the drains probably occurred, and the relatively dry winter of 1933-34, when conditions provided no adequate test of the drains. In nearly all instances this information has been forthcoming and has been incorporated in the table.

TABLE I

c.h. = cable haulage ; d.h. = direct tractor haulage ;
p.e. = partially effective.

Possible* Life. Years	No. of Sites reported on	Results : Life of drainage system in years
11	5	9½ ; 9 ; 9 + 2 p.e. ; 5 + 6 p.e. ; 4 + 5 p.e.
10	5	9 ; 8 + 2 p.e. ; 4 ; 4 with c.h., d.h. doubtful ; 2.
9	1	9.
8½	3	8½ ; 5 + 3½ p.e. ; 3.
8	2	7 ; part 8, part 7
7½	1	3½ + 2½ p.e.
7	4	7 ; 7 ; 3 + 4 p.e. ; 2.
6½	1	Failure.
6	6	6 ; 6 ; 6 ; 5 ; 5 ; failure.
5½	2	3 + 1½ p.e. ; part 5, part 2 + 3½ p.e.
5	3	Part 5, part failure ; 3 + 2 p.e. ; 1.
4½	1	Doubtful (1 report only).
4	3	4 ; 4 ; failure.
3	4	3 ; 3 ; 3 ; failure.
2½	1	2½ p.e.
2	1	2 months only.
	43	

* Longest possible life up to time of last report.

Conclusion.—The figures in the Table serve to show that some mole drains, drawn for the most part by direct tractor haulage at a depth of 14-16 in. and

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rarely exceeding $2\frac{1}{2}$ in. in diameter, have lasted for practically 10 years; and there are many instances of their having functioned satisfactorily for from 5 to 9 years. It will be seen that, in a number of instances, the drains remained partially effective for some years after deterioration had set in; the benefits of drainage were evident for some considerable time after the drains had ceased to function really well.

The benefits of the drainage which were observed, are briefly, improvement in the character and composition of the herbage, improvement in the hay crop, an extension of the grazing season, and the possibility of outwintering stock. In some instances, the beneficial effect has been increased by grazing, by dressings of phosphatic manures, basic slag, lime, etc., and by such treatment as the cutting of rushes. There is no doubt that where the drainage has been most successful, and has lasted longest, care has been taken to complete the work done at the demonstration, as, for example, the laying of a tile-main by experienced drainers, and the system has been well looked after.

The method of direct tractor haulage is a very cheap method of mole drainage, and the extra cost of providing a proper main and outfall, or of piping and fencing-off the outlets, and keeping the ditch cleaned out, is amply repaid, since the system is made really effective and will last for a considerable number of years.

¹ Close, Thompson Mole Draining by Direct Haulage. This *Journal*, July, 1925, p. 303. Close, Thompson: Mole Drainage Demonstrations. This *Journal*, October, 1926, p. 587. Close Thompson: Mole Draining by Direct Tractor Haulage. This *Journal*, June, 1929, p. 222.

² Blackaby, J. H.: Technical Notes on Mechanized Farming. No. 1. Mole Drainage. Inst. for Res. in Agric. Eng., Oxford, 1932.

³ Davies, C.: A Note on Mole Draining. *Jour. S.E. Agric. College*, Wye, July, 1932, p. 110.

⁴ Lewis, T., and others: A Note on the Cost of Mole Draining. *Jour. R.A.S.E.*, 1925, p. 43.

⁵ Nicholson, H. H.: The Mode of Action of Mole Drains. *Farm and Machine*, Vol. II, 1935, p. 61.

⁶ Blackaby, J. H.: Technical Notes on Mechanized Farming. No. 1. Mole Drainage. Inst. for Res. in Agric. Eng., 1932. Blackaby, J. H.: Land Drainage Machinery, *Engineering*, Dec. 29, 1933, p. 702.

THE CAMPAIGN FOR THE CONTROL OF THE MUSK RAT IN ENGLAND AND WALES

THERE is good ground for believing that the action taken for the control of the musk rat has resulted in a considerable measure of success, and the present seems to be an opportune time for a brief survey of the campaign that has extended over the last four years.

The musk rat is believed to have been introduced into Europe in 1905, and it spread rapidly over parts of southern Germany and neighbouring countries, but, as far as is known, the first musquash fur farm in England was not established until 1929. Its habit of burrowing deeply into the banks of waterways renders the existence at large of the animal a potential source of danger to rivers, canals, embankments, etc., and at an early stage of its introduction into this country it was thought desirable to make an investigation into the conditions under which it was being kept in this country. The investigation, which was carried out jointly in 1930 by Mr. E. C. Read of the Ministry of Agriculture and Fisheries and Mr. M. A. C. Hinton, F.R.S., of the British Natural History Museum, showed that musk rats were being kept by a considerable number of persons. In the majority of individual instances, the animals kept were few and were securely penned. In a few instances, however, the number was comparatively large, the animals being kept in wired-in enclosures where they were left to breed under natural conditions. In such circumstances, the possibility of escape was evident, and during 1931 several reports of escapes did, in fact, come to the notice of the Ministry. In view of the possibility of the animals overrunning the country and as the result of their burrowing through the banks of streams, etc., causing serious floods and damage to agricultural crops and small livestock, powers were sought and obtained to control the conditions under which musk rats could be imported and kept.

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The Destructive Imported Animals Act, 1932, authorized the Minister of Agriculture and the Secretary of State for Scotland, acting jointly, to prohibit by Order, either absolutely or except under licence, the importation into or keeping within Great Britain of musk rats, and, at any time when such an Order was in force, to take steps for the destruction of any musk rats at large.

By the Musk Rats (Importation and Keeping) Order, 1932, the importation and keeping of musk rats in Great Britain, except under licence, was prohibited as from May 1, 1932, and drastic conditions under which such licences might be granted were set out in the Musk Rats (Importation and Keeping) Regulations, 1932. As a result of the conditions imposed, only 14 applications were made and granted for licences to keep musk rats in England and Wales, and one licence only was issued permitting importation in special circumstances. A brief experience of the licensing system showed, however, that it was impossible by regulation, however stringent, to eliminate the risk of escape, and by the Musk Rats (Prohibition of Importation and Keeping) Order, 1933, the importation into and keeping of musk rats in Great Britain was prohibited absolutely as from April 1, 1933. All the musk rats formerly kept under licence were destroyed.

The first escapes on a serious scale occurred from a fur farm in the neighbourhood of Shrewsbury, and resulted in the River Severn and adjoining streams and ponds in that area being infested by musk rats in considerable numbers. As soon as the Act came into operation, steps were taken by the Ministry, in collaboration with the Shropshire County Council, to bring this infestation under control. As a preliminary measure, and in order to obtain early information as to the extent of the infested area, rewards were offered during a limited period for any animals caught, and, in the meantime, trappers were engaged to work in the locality under the direction of a supervisor, and plans for the campaign were formulated by the Ministry.

In order to obtain early information of the presence of any musk rats that might be at liberty in other

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areas, wide publicity was given to the provisions of the Act. A descriptive leaflet was prepared by the Ministry and circulated to all agricultural committees, catchment boards, drainage boards outside catchment areas, fishery boards and water and canal undertakings, and all persons known to have kept or to be interested in the keeping of musk rats were approached. The co-operation of the police was also secured, and illustrated posters were displayed in areas where the presence of musk rats was suspected. As a result of this publicity a large number of reports relating to the suspected presence of musk rats in various parts of the country were received during 1932 and 1933. All of these reports were carefully investigated, but the presence of musk rats in appreciable numbers outside Shropshire was established only in West Sussex and Surrey, and infestation in these counties appeared to be limited to short stretches of the River Arun, near Pulborough, and of the River Wey, near Farnham. With the co-operation of the West Sussex County Council, control measures were initiated in the affected areas in March, 1933, some of the trappers who had by this time gained experience of the work in Shropshire being transferred to the area for the purpose.

In Shropshire and in the West Sussex-Surrey area similar plans of campaign were adopted. The areas presumed to be infested, amounting in Shropshire to some 700 square miles, and in west Sussex and Surrey to about 100 square miles, were divided into districts, and a trapper was allocated to each for the purpose of making a systematic examination of the area and the setting of traps wherever traces of musk rats were found. Meanwhile, searchers were engaged on the borders of the areas in order to determine the external limits of the infestation, and the efforts of the trappers were then directed inwards from such external limits so as to drive the musk rats back towards the centre of infestation along the river banks, and eventually on the rivers themselves, with the object of exterminating them.

The work was, of course, of an entirely novel character in this country, and while a few of the men engaged had had experience of the musk rat as

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trappers in Canada and elsewhere, all the staff had to gain experience in the special problems involved in exterminating the animals under new conditions. As far as was possible, advantage was taken of the experience gained in dealing with the same problem in Germany, and early in 1933, Dr. Pustet, the head of the Bavarian musk rat control service, and Herr Roith, the chief trapper, visited this country, by arrangement between the Ministry and the German Government, to advise on the steps that might be taken towards extermination and to instruct the staff in trapping methods that had proved effective in Germany.

Arrangements were also made with the Bureau of Animal Population, Oxford University, to undertake biological research into the habits of the musk rat, and a biologist was appointed to carry out the necessary work in the field.

The methods adopted have, it is believed, proved effective, and the following table, showing in half-yearly periods, the number of men engaged and the number of musk rats captured since the inception of the campaign, gives some idea of the progress of the work :—

Half-year ended :—	Maximum number of trappers employed		Number of musk rats captured	
	Salop	W. Sussex & Surrey	Salop	W. Sussex & Surrey
June 30, 1932 ..	4		980*	—
Dec. 31, 1932 ..	31		1,496	—
June 30, 1933 ..	31	8	722	146
Dec. 31, 1933 ..	28	8	342	37
June 30, 1934 ..	25	8	119	25
Dec. 31, 1934 ..	15	6	62	5
June 30, 1935 ..	10	6	7	2
Dec. 31, 1935 ..	6	3	None	None

* Most of these were captured under the preliminary scheme for the payment of rewards.

The most recent captures were made in Shropshire in May, 1935, when two musk rats were trapped, and in the West Sussex-Surrey area none has been taken since April, 1935. It is, of course, not yet possible to say with certainty that the musk rat has been exter-

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minated in England and Wales, since one or more stray specimens, or even a breeding pair, may yet survive in some remote spot, but the most careful search by skilled trappers during the past nine months has failed to bring to light any trace of their presence. Accordingly, the staff is now being reduced to a minimum, but it will be necessary to retain the services of a few trappers for some considerable time to watch the position and to cope with any signs of re-infestation that may appear.

It should be added that the Ministry is under a great obligation to the British Natural History Museum and to the County Councils of Shropshire and West Sussex and their staffs, for ready co-operation in the work already accomplished.

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Milk Marketing Scheme: Pool Prices for January, 1936.—Pool prices and rates of producer-retailers' contributions for January, 1936, are given below, with comparative figures for December, 1935, and January, 1935. In each month the wholesale liquid milk price was 1s. 5d. per gal.

Region	Pool Prices (d. per gal.)			Producer-Retailers' Contributions (d. per gal.)		
	Jan., 1936	Dec., 1935	Jan., 1935	Jan., 1936	Dec., 1935	Jan., 1935
Northern	13½	13½	14½	3½ ⁵ / ₆	3½	2½
North-Western	13½	13½	14½	3½ ⁵ / ₆	3½ ¹ / ₅	2½
Eastern	13½	14	14½	2½ ⁵ / ₆	2½ ¹ / ₆	2½ ⁵ / ₆
East Midland	13½	13½	14½	3½	2½	2½
West Midland	13½	13½	14	3½ ⁵ / ₆	3½	2½
North Wales	13½	13½	14½	3½ ⁵ / ₆	3½	2½ ⁷ / ₆
South Wales	13½	13½	14½	3½	3½ ¹ / ₆	2½ ¹ / ₆
Southern	13½	14	14½	2½ ⁵ / ₆	2½ ¹ / ₆	2½
Mid-Western	13½	13½	14	3½ ⁵ / ₆	3½	2½
Far Western	13	13	14	3½	3½ ⁷ / ₈	2½
South-Eastern	14	14½	15½	2½	2½	1½ ¹ / ₆
Unweighted Average	13·43	13·55	14·45	3·18	3·03	2·28

These prices do not include any premiums for special services and level deliveries, or the premium of 1d. per gal. paid to accredited producers. The number of accredited producers was 14,453, and the sum required for the payment of the premium to them is estimated to equal a levy of 298d. per gal. on all the milk sold during the month. The levy for expenses, liabilities and reserves remained at ¼d. per gal.

Sales on wholesale contracts were as follows:—

	January, 1936 (estimated) gal.	January, 1935 gal.
Liquid	46,127,055	46,680,384
Manufacturing	21,106,120	18,520,334
	67,233,175	65,200,718
Percentage liquid sales	68·6	71·6
Percentage manufacturing sales	31·4	28·4

The average realization price of manufacturing milk during January was 5·94d. per gal. compared with 6·31d. per gal. for January, 1935. The quantity of milk manufactured into cheese on farms was 355,384 gal. compared with 215,739 gal. in January, 1935.

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Pigs and Bacon Marketing Schemes: Pig Prices for February.—The contract price of the basic pig (Class I Grade C) in February, 1936, was 10s. 8d. per score, compared with 9s. 11d. for January. There was no change in the cost of the feeding stuffs ration; the rise in pig prices was due to the rise in the ascertained bacon price from 76s. 11d. to 84s. 3d. per cwt., and an improvement in the realization value of offals from 9s. 1d. to 9s. 5d. per pig.

Bacon-Pig Contracts for 1936.—As in the previous month, the number of pigs on contract for the month of February was insufficient to meet curers' requirements. In the circumstances, curers were enabled to buy pigs on the open market to bring their total throughput up to 72 per cent. of their requirements.

Potato Marketing Scheme: Census of Potato Stocks.—All registered producers and authorized merchants have been requested to furnish the Potato Marketing Board with returns showing the stocks of potatoes on hand on the night of February 15.

Hops Marketing Scheme.—Trading in hops of the 1935 season began on January 15. During the first 29 days of trading, hops were only offered and sold to merchants nominated by brewers who had entered into a contract with the Hops Marketing Board.

The Board have co-opted Mr. J. W. Hely-Hutchinson as a Special Member to fill the vacancy caused by the death of Major C. M. Higgins.

Committee of Investigation for England.—The hearing of evidence and arguments upon the complaints made by the Central Milk Distributive Committee and by the Parliamentary Committee of the Co-operative Congress against the operation of the Milk Marketing Scheme was concluded on February 11.

Regulation of Imports of Meat: (i) Period to December, 1935.—The position in regard to imports of meat in the third quarter of 1935 was reviewed in the December, 1935, issue of this JOURNAL (pp. 929-930). The following statements show (a) for Empire countries, the quantities of meat imported in the six months July-December, 1935, compared with allocations and with imports in the corresponding period of

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1934, and (b) for foreign countries, imports in the three months October-December compared with allocations and with imports in the last quarter of 1934 :—

(a) EMPIRE COUNTRIES

	<i>Allocations,</i> July-Dec., 1935	<i>Imports</i> July-Dec., 1935 (000 cwt.)	July-Dec., 1934
Chilled and frozen beef and veal ..	1,946·4*	1,812·3	1,752·5
Frozen mutton and lamb	2,528·2	2,211·1	2,348·0
Frozen pork	345·8†	284·3	244·1

(b) FOREIGN COUNTRIES

	<i>Allocations,</i> Oct.-Dec., 1935	<i>Imports,</i> Oct.-Dec., 1935 (000 cwt.)	Oct.-Dec., 1934
Chilled beef	1,871·1	1,866·8	1,865·8
Frozen beef (carcass and boned beef) and veal	65·7	58·1	57·7
Frozen mutton and lamb	242·5	260·9	250·3
Frozen pork	99·3	63·9	158·1

Supplies of all classes of meat from Empire countries in the second half of 1935 were thus well within the agreed maxima. Imports of beef and veal and mutton and lamb from foreign sources in the last quarter of the year conformed closely to the allocations, which represented for chilled beef 88½ per cent., and for frozen beef (carcass and boned beef) and veal and mutton and lamb 65 per cent., of the quantities imported in the corresponding quarter of the Ottawa year (July, 1931- June, 1932). Owing to short supplies from the United States of America, imports of frozen pork from foreign countries were about 35 per cent. below the allocations, which represented the average of imports in the corresponding quarter of the three years 1932, 1933 and 1934.

(ii) *January-June, 1936.*—The following announcement regarding imports of beef and veal in the first half of 1936 was made by the Minister of Agriculture and Fisheries in answer to a question in the House of Commons on February 13, 1936 :—

* Including a carry-over of 70,000 cwt. from the second quarter.

† Including one-half of the allocations for baconers to Australia and New Zealand for the year 1935.

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"Agreement has been reached with the Governments of Australia and New Zealand, and also with the Government of Argentina, on a programme whereby total arrivals of beef and veal in the United Kingdom from those countries, during the six months to the end of June next, will not exceed the quantities imported in the corresponding period of 1935. As regards the arrivals from the smaller Empire sources of supply, it is expected, in this case also, that arrivals during this period will not exceed those arranged for the first half of last year."

Total imports of beef and veal from Empire and foreign sources in the first six months of 1935 were :—

		ooo cwt.
Empire	.. ..	1,071.8
Foreign	.. ..	4,560.2

Regulation of Imports of Bacon and Hams.—In the January, 1936, issue of this JOURNAL (p. 1026) it was stated that it had been decided that the foreign quota should continue for the first six weeks of 1936 at the rate in operation in the last quarter of 1935. It was subsequently arranged that the total foreign quota should remain at the same level (i) for the two weeks to February 25, 1936, and (ii) for the remainder of the period to the end of April, 1936.

The allocations to the individual foreign export-ing countries for these two periods are as follows :—

Country.	Allocations February 12-25, 1936, cwt. (a)	Allocations February 26- April 30, 1936, cwt. (a).
Denmark	122,564 (b)	585,649
Netherlands	18,336	87,616
Poland	15,345	73,321
Sweden	9,072	43,347
Lithuania	5,694	27,208
Estonia	1,535	6,917
Finland	819	3,689
Latvia	1,433	6,456
U.S.S.R.	1,740	7,840
Argentina	1,433	6,456
U.S.A.	15,441	73,783
Allowance for imports from foreign countries not scheduled to the Bacon (Import Regu- lation Order).	4,609	22,313
Total	198,081	944,595

(a) Subject to amendment, in the case of certain individual countries, in respect of oversh shipments or undershipments in previous periods.

(b) In addition to this quantity, Denmark will be permitted to ship 6,888 cwt., being part of the adjustment due in respect of deficiencies to imports from that country in 1935.

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Regulation of Imports of Processed Milks.—

The arrangements made for the regulation of imports of processed milks from foreign countries and the Irish Free State in the last quarter of 1935 were described in the December, 1935, issue of this JOURNAL (pp. 930-931). Similar arrangements have now been made for the first quarter of 1936.

Imports of processed milks during the year 1935, together with the allocations made to foreign exporting countries and the Irish Free State and imports from other Empire countries in the two previous years, are shown in the following table:—

Source.	Condensed Skimmed Milk.	Condensed Whole Milk.	Milk Powder.	Cream.
	cwt.	cwt.	cwt.	cwt.
Foreign Countries				
Allocations ..	1,294,000	274,000	88,000	40,000
Imports..	1,338,000	232,000	46,000	41,000
Irish Free State—				
Allocations ..	68,000	20,000	*	39,000
Imports..	67,000	21,000	560	34,000
Other Empire Countries—				
Imports 1933 ..	650	139,000	193,000	—
Imports 1934 ..	—	119,000	172,000	—
Imports 1935 ..	—	129,000	172,000	—

* Imports of milk powder from the Irish Free State are not at present subject to regulation.

Coal-Cattle, etc., Arrangement with Irish Free State.—The following is the text of an announcement made by Mr. Hacking, Under-Secretary of State for Dominion Affairs, in the House of Commons on February 17, 1936:—

“As the result of discussions during the last few weeks, it has now been agreed that the arrangement made a year ago in regard to the export of coal from the United Kingdom to the Irish Free State and of cattle from the Irish Free State to the United Kingdom shall be continued on a £ for £ basis. Following the arrangement of a year ago, the United Kingdom exports of coal to the Irish Free State in 1935 were one million tons greater than in 1934, and it is anticipated that there will be a further increase in 1936. It will be remembered that the Irish Free State Government have recently removed the duty of 5s. a ton on United Kingdom coal.

Further, the United Kingdom Government will reduce by 10 per cent. *ad valorem* (or by a corresponding proportion in the case of specific duties) the existing duties on live animals and on meat, except

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pigs and pig meat, and make additional reductions in the duties on horses, sheep and lambs, and mutton and lamb; minor adjustments will also be made in the reduced cattle duties. The arrangements for the regulation of imports of bacon and hams into the United Kingdom in 1936 will provide for an increase of 10 per cent. in supplies from the Irish Free State as compared with 1935.

"The Irish Free State Government, for their part, will reduce by 10 per cent. *ad valorem* (or by a corresponding proportion in the case of specific duties) the existing Emergency Duties on United Kingdom goods. Finally, the Irish Free State Government will reserve for the United Kingdom one-third of the imports of cement into the Irish Free State, practically the whole of which has come from foreign countries in recent years.

"The reductions of duties on both sides will take effect on Wednesday, the 19th February.

The new rates of the United Kingdom duties are set out in the Irish Free State (Special Duties) (No. 1) Order, 1936, issued by the Treasury on February 17.

Milk Act, 1934.—Payments made by the Ministry of Agriculture and Fisheries up to February 15, 1936, are as follows :—

(a) Advances in respect of manufacturing milk.

Section		Period of manufacture	Gallons	Amount
	(1) <i>To the Milk Marketing Board for England and Wales.</i>			£
	In respect of milk—			
1	Manufactured at factories other than the Board's	April, 1934, to Nov., 1935	300,415,870	1,608,130
2	Manufactured by the Board	April, 1934, to March, 1935	846,293	5,924
3	Made into Cheese on farms	April, 1934, to June, 1935	20,653,552	120,236
	Total for England and Wales ..		321,915,715	1,734,290
	(2) <i>To the Government of Northern Ireland.</i>			
	In respect of milk—			
6	Manufactured into cream and butter at registered creameries	April, 1934, to Nov., 1935	38,220,424	281,884

(b) Contributions towards the expenses of the Milk Marketing Board for England and Wales in carrying out approved arrangements for increasing the demand for milk.

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Section	Nature of Service	Period covered	Gallons	Amount
11	Supply of Cheap Milk to school-children	Oct., 1934, to Oct., 1935	24,788,867	£ 447,496
	Initial Publicity for above	Sept. to Oct., 1934	—	2,000
	General Publicity	May to Oct., 1935	—	6,875
		Total	..	456,371

Extension of Milk Act, 1934.—The Minister of Agriculture and Fisheries made the following announcement in the House of Commons on February 10: "For several reasons, including the currency of various trade agreements and the fact that the report of the Reorganization Commission for Milk for Great Britain is not likely to be published for some time to come, it is not possible at present to bring before Parliament long-term legislation for the milk industry. In order to allow adequate time for the consideration by all parties of the important questions at issue, the Government have decided to ask Parliament to continue until the end of September, 1937, the main provisions of the Milk Act, 1934. A Bill to give effect to this decision will be introduced forthwith."

The Milk (Extension of Temporary Provisions) Bill was read a second time in the House of Commons on February 20, 1936. It provides for the extension for eighteen months from April 1, 1936, of the period of operation of Sections 1, 2, 3 and 6 of the Act relating to Exchequer advances in respect of manufacturing milk, for a corresponding extension of eighteen months from April 1, 1938, of the provisions of Section 5 relating to repayment of such advances, and for Exchequer contributions under Section 11 towards expenditure incurred by Milk Marketing Boards in increasing the demand for milk to be continued until September 30, 1937.

Cheese-Milk Price.—For the purpose of Exchequer advances under the first three Sections of the Milk Act, in respect of milk used for manufacture, the cheese-milk price has been certified by the Minister

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and the Secretary of State for Scotland to be 4·57 pence per lb. for the month of February, 1936.

The Cattle Fund.—Payments under the Cattle Industry (Emergency Provisions) Acts, 1934 and 1935, to producers of certain classes of fat cattle in Great Britain and Northern Ireland amounted by February 15 to £5,354,487. These payments were in respect of 2,249,406 animals, the average payment per beast being £2 7s. 7d. Some 671,000 imported animals have been marked at ports (excluding Northern Ireland) since August 6, 1934, under the Marking of Imported Cattle Orders, 1934 and 1935.

Wheat Act, 1932: *Sales of Home-Grown Wheat—Cereal Year 1935-36.*—Certificates lodged with the Wheat Commission by registered growers during the period August 1, 1935, to February 7, 1936, cover sales of 21,532,591 cwt. of millable wheat, as compared with 22,084,717 cwt. in the corresponding period (to February 8, 1935) in the last cereal year.

Anticipated Supply of Millable Wheat.—The Minister, on the recommendation of the Wheat Commission, has made, under Section 2 of the Wheat Act, the Wheat (Anticipated Supply) No. 1. Order, 1936. This Order varies the Wheat (Anticipated Supply) No. 2. Order, 1935, by substituting 30,400,000 cwt. for 29,200,000 cwt. as the quantity of home-grown millable wheat of their own growing that it is anticipated will be sold by registered growers during the cereal year 1935-36. This variation is due to increases in the final estimates of acreage and yield of home-grown wheat of the 1935 harvest.

The Order does not have the effect of increasing the total sum that will be received by registered growers as a whole on account of deficiency payments, nor will it increase the amount of quota payments to be made by millers and importers of flour. The Order will, however, affect the quantity of wheat which the Minister may require the Flour Millers' Corporation to buy in June or July next, in the event of the Wheat Commission representing to the Minister that it is expedient for him to exercise this power under the Act.

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Sugar-Beet: *Sugar Industry (Reorganization) Bill.*—The Bill to implement the proposals of the Government with regard to its future sugar policy, which were outlined in the White Paper (Cmd. 4964) dated July 30, 1935, received a second reading in the House of Commons on February 10. An Explanatory Memorandum (Cmd. 5080) on the Bill has been issued.

Production of Home-Grown Beet Sugar During 1935-36 Campaign.—According to returns made by the beet sugar factories operating in Great Britain, the total quantities of beet sugar manufactured during January, 1936, and the corresponding month in 1935 were :—

		Cwt.		
		White	Raw	Total
1936..	..	350,269	517,851	868,120
1935..	..	542,760	1,707,941	2,250,701

The total quantities of sugar produced to the end of January in each of the two manufacturing campaigns were :—

		Cwt.		
		White	Raw	Total
Campaign 1935-36	..	4,338,264	5,407,673	9,745,937
Campaign 1934-35	..	4,757,519	7,320,721	12,078,240

1935-36 Campaign.—Provisional results of the present campaign are now available and are shown below in comparison with the final figures for the 1934-35 campaign —

		1935-36 Provisional	1934-35
Acreage	.. ..	374,600	403,884
Beet tonnage	.. ..	3,400,000	4,094,707
Yield per acre (tons)	.. ..	9·1	10·1
Sugar content (%)	.. ..	16·4	17·1
Sugar production (tons)	.. ..	487,320	614,798

National Mark Eggs.—The National Mark Scheme for Eggs, introduced in February, 1929, is now in its eighth year of operation, and it is satisfactory to note that during 1935 the total output of authorized packing stations reached 549·4 millions. This figure is an increase of 49·7 millions on the previous year's total. The quantity actually packed under the National Mark during the year 1935 was 457·2 millions, which represents 83 per cent. of the total output of packing stations under the scheme. The latter figure is an increase on the previous year when the corresponding total was 411·3 millions.

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The number of packing stations operating under the scheme in 1935 was 192, an increase of seven during the year. The number operating in the last three years may be classified according to output as follows :—

<i>Output</i>	<i>No. of Stations</i>		
	1933	1934	1935
Over 10 million eggs	6	5	5
5 to 10 " " " "	22	23	27
2 to 5 " " " "	36	51	56
Under 2 " " " "	92	106	104

No substantial amendments were made to the scheme during the past year, but in order to assist in quality control and in preserving the reputation of the National Mark as a guarantee of quality, a scheme for the registration of approved retail distributors of National Mark eggs was introduced. The scheme has met with a good response and already 5,000 shops have been enrolled.

Investigation into the specification of standard containers for National Mark eggs is being continued at the Forest Products Research Laboratory, Princes Risborough.

Other investigations undertaken in 1935 related to :—

- (1) The effect of transport on new laid eggs, and
- (2) The effect on quality of various methods of cleansing used in practice.

Egg Faults.—Over 80 different terms descriptive of egg faults are known to be in common use, and in many instances several terms denote the same fault. The National Mark Egg and Poultry Trade Committee has recommended that the following inclusive nomenclature should be adopted by all authorized packers. It will be used by the Ministry's Officers, and it is hoped that it will in time be adopted by producers and all sections of the trade.

NOMENCLATURE FOR EGG FAULTS.*

<i>General</i>	<i>Yolk</i>	<i>White</i>	<i>Air Cell</i>	<i>Shell</i>
Blood spot.	Sided	Discoloured.	Large.	Faulty.
Blood egg.	Stuck.	Cloudy.	Running.	Dirty.
Meat spot.	Discoloured.		Ringed.	Stained.
Stale.	Patchy.			Cracks.
Incubated.	Spread.			
Mould growth.				
Rot.				
Tainted.				

* Eggs showing any of these faults must not be packed under the National Mark.

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It will be noted that the term "watery white" has been omitted from the standard nomenclature; the condition of weak or "watery" white in eggs can be covered by other terms that will be recognized by candling operators under the headings of "Yolk" and "Air Cell" in the above list.

The following notes provide a brief explanation of the terms recommended:—

GENERAL FAULTS.

Most of these terms refer either to the presence of foreign bodies in the egg or to general conditions

(a) *Blood Spot*.—Blood spots and blood streaks are clearly seen when the egg is rotated before a light. They are distinguishable from meat spots by a pinkish colour and they may occur in the white or adhering to the yolk.

(b) *Blood Egg*.—The blood is not concentrated in spots or streaks, but is diffused in the white or spread round the yolk.

(c) *Meat Spot*.—This covers all solid bodies other than blood spots. Meat spots are generally of a fleshy character and float freely in the white, or are embedded in the chalazæ or attached to the yolk; they are clearly visible when the egg is rotated.

(d) *Stale*.—This term covers a combination of faults generally due to age, and is synonymous with such descriptions as "nest eggs," "held eggs," "incubator clears." In general, the air cell is abnormally large, clearly defined and often ringed. The yolk is, as a rule, sided.

(e) *Mould Growth*.—This usually appears in grey or black patches, varying in size, which form on the inside of the shell or shell membrane.

(f) *Incubated*.—This can be recognized in the early stage of a fertile egg by a bubble-like formation on the yolk, or, in more advanced incubation, by thin blood vessels or blood ring on the yolk. The term covers such faults as "germ spot," "addled," and "broken yolk." Infertile eggs, e.g., "incubator clears" would be included under this head if the evidence of incubation were sufficiently marked.

(g) *Rot*.—This covers red, white or black rot, and includes all eggs with bacterially affected yolks, whether due to a diseased condition of the fowl or to exposure of the egg to unfavourable conditions.

(h) *Tainted*.—This covers all abnormal odours whether inherent or acquired from external sources.

YOLK FAULTS

(a) *Sided*.—The term is used when the yolk has become displaced to any appreciable extent from its normal central position. The yolk may be either floating, sunken or to one side.

(b) *Stuck*.—The yolk is found adhering to the shell or membrane.

(c) *Discoloured*.—The yolk is of a dark or greyish appearance.

(d) *Patchy*.—This is used to denote unevenness in the yolk colouring and includes such terms as heated or heat spots.

(e) *Spread*.—This describes yolks which are abnormal in shape, e.g., flattened or irregular.

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WHITE FAULTS

(a) *Discoloured*.—The white is definitely tinted (grey, yellow, green or brown).

(b) *Cloudy*.—This term is used when the white is 'muddy or streaky in appearance.

AIR CELL FAULTS

(a) *Large*.—This describes an air cell which exceeds quarter inch in depth.

(b) *Running*.—This condition arises when the inner membrane is broken. The white of the egg fills the air space and one or more bubbles result and can be seen to move round the shell as the egg is turned.

(c) *Ringed*.—This term is used when the air cell is sharply defined with the edges grey or brown in colour.

SHELL FAULTS

(a) *Faulty*.—This includes weak, rough or mis-shapen shells.

(b) *Dirty*.

(c) *Stained*. Self-explanatory.

(d) *Cracks*.—This covers slight or "hair" cracks in addition to those which are visible without candling.

National Mark Scheme for White Wensleydale Cheese.—As a result of a number of meetings of makers of Wensleydale cheese, held recently under the auspices of the local branch of the National Farmers' Union, a provisional National Mark Scheme for White Wensleydale Cheese has been drafted, and cheese-makers have agreed upon draft statutory definitions of quality for one grade, "Selected White," made from full-cream cows' milk produced in England and Wales.

It is proposed that the grading shall be carried out by an independent grader under the supervision of the National Mark Wensleydale Cheese Grading Committee, which has been set up for the purpose, and that his remuneration shall be met from the grading fees.

National Mark Scheme for Cream Cheese.—The draft National Mark Scheme for Cream Cheese, outlined in the December issue of the JOURNAL, has been approved by the National Mark Cheese Trade Committee with the following amendment: the minimum total annual output of cream cheese required as a qualification for authorization under the Scheme has been reduced from 5 cwt. to 2 cwt.

Full particulars of the Scheme, which will be put into operation at an early date, are given in Marketing

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Leaflet No. 83 entitled " Cream Cheese : Grading and Marking." Copies may be obtained free of charge on application to the Ministry.

South London Exhibition.—The Ministry is staging a comprehensive exhibit of National Mark products at this exhibition, which is to be held at the Crystal Palace, London, from March 4-14. Working demonstrations of the testing, grading and packing of National Mark eggs will be given daily.

Efforts to Increase Consumption of Bread.*—In several European countries efforts are being made to increase the consumption of bread by price concessions, improvement in quality or propaganda. In France and Portugal the aim in view is to reduce the pressure of supplies in the wheat market ; in the case of Germany it is to reduce the demand for imported foodstuffs that have replaced bread in the dietary. The following is a brief summary of the steps taken.

France.—An inter-departmental committee of representatives of the Ministries of Agriculture and Health, which was set up in April, 1935, to examine the problems in regard to the baking and consumption of bread, is about to issue its report. The heavy fall in bread consumption, which is estimated at 15 per cent. since 1913, is thought to be due in part to deterioration in quality : an improvement in this direction might therefore lead to increased consumption.

Germany.—Increased bread consumption through improvement in quality, coupled with propaganda, is the aim of a recent resolution of the Reich Nutrition Association. The Association, which comprises representatives of the relevant official bodies, asserts that the quality of bread often leaves much to be desired, and it calls upon the industry to give consideration to milling as well as baking with a view to remedying the situation

It has been suggested, however, that the heavy decline in bread consumption in Germany since the pre-war period is due to the lower birth-rate (children being the greatest consumers of bread), and to the establishment of factory canteens where workmen can get satisfactory cheap meals, which take the place of the thick sandwiches that they used to bring with them to work. The propaganda to increase bread consumption at the present juncture is said to be connected with the short potato crop.

Portugal.—The Government has recently passed legislation to bring relief to a glutted wheat market. An important feature of the measures is an effort to increase bread consumption by reducing the price and, at the same time, introducing three qualities of bread, the cheapest of which, though good, will not be too dear for the poorest consumers. Maximum prices for 1st, 2nd and 3rd quality bread have been instituted, the price of the cheapest loaf being about 60 per cent. of that of the dearest.

* Note by the Market Supply Committee.

MARCH ON THE FARM

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MARCH is one of the critical months of the year on the farm, this month's weather having a great influence on the success of the season's operations. On the arable farm, a wet March delays most of the sowing; on farms where grass flocks provide a large proportion of the revenue, as in this area, cold wet weather, or snow at lambing time, may reduce the receipts considerably. As an example of the kind of loss likely to be suffered on mountain farms at this time of the year, figures may be quoted from a breeder writing in the *Scottish Journal of Agriculture* (October, 1935); in a blizzard in the winter of 1929-30, 4 per cent. of the ewes and 12 per cent. of the ewe hogs were lost.

One of the most prevalent beliefs regarding the weather is that the conditions at the end of this month are sure to be the opposite of those at the beginning. "Comes in like a lion, goes out like a lamb" or vice-versa, provides an example of an unscientific type of forecast based on sequence, i.e., that particular conditions prevailing at a given period lead to a certain kind of weather later. Another example of such a belief is that "If frost holds a man before Christmas, it will not hold a duck after." It is annoying, however, to find that these forecasts are so often correct!

Dairy Herd.—While, in the south, the herds will be out to grass in less than a month, those in the north have still nearly two months indoors. Many farmers are apprehensive as to their stocks of roots and fodder. The continuously wet weather in the autumn compelled many to bring in their cattle a month earlier than usual. When making a stock-taking of the hay and root supplies, many have to end up with the consoling thought that "perhaps we shall have an early spring."

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There is a surplus of milk at this time of the year and dairy cows become cheap: the milk surplus has now, however, become a collective concern rather than that of the individual. A large proportion of cows calve this month, though there has been, in recent years, a distinct tendency to spread out the calvings more evenly. Spring is the natural time of the year for calving, the cow in the wild state (as with Park Cattle to-day) being then able to bring up her calf at the period of greatest vegetative growth. The average domestic cow can be made to calve at any period of the year, but, as cows get older, they tend more and more to revert to spring calving. In an investigation carried out in this district, 17·2 per cent. of the cows calved their first calf in March, April or May; the proportion calving in this period increased with age, until, with cows calving for the sixth time, it reached 48 per cent.

Spring calvers, particularly those calving in March and April, yield more milk on the average than those calving in summer; the latter become dry before the spring grass, and miss the spring flush. Sanders, in the *Journal of Agricultural Science*, 1928, after an examination of the records of milk recording societies in Norfolk and in the Penrith area, gave to March and April calvers a correction factors of—0·2 and—2·2 per cent. respectively, while to July and August calvers, the corrections calculated were + 7·0 and + 5·0 per cent. respectively. In other words, if it were desired to compare, on a fair basis, the yield of a cow calving in March with that of a cow calving in July, the yield of the former should be lessened by 0·2 per cent., and that of the latter increased by 7·0 per cent., to make up for the advantage of calving in the one month and the disadvantage of calving in the other. In the investigation referred to, the months October to February inclusive proved the best calving time for the Norfolk cows, so far as milk yield was concerned, while the months August to November were the most favourable for those in the Penrith area. The difference is probably due to the types of feeding in an arable and grass area.

Store Cattle.—It is well known that cattle fatten-

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ing on grass make much better headway if they have wintered out, or have been put on grass in the daytime and in open yards at night; such cattle are not subject to the setback suffered when those that have spent the winter indoors are turned out to grass. Many graziers from Anglesey, when buying stores in the neighbouring county, have been in the habit of buying in March, so that the cattle could have some time on grass before the spring growth; such stores have been well wintered in open yards and have good coats of hair. The buying has become gradually earlier, each large buyer wishing to be first on the scene; many of these cattle are now purchased before the end of February. A large-scale buyer remarked the other day that his stores for fattening on grass have often arrived in a snowstorm. The same buyer also remarked that, up to a generation ago, buying in the store districts of Caernarvonshire did not begin until after Leicester Fair on March 12, because the pick of the cattle used to be trucked to meet a brisk demand at that centre.

Grass Flocks.—March is the busiest month of the year with the average lowland grass flock; lambing on most farms occurs this month. With mountain flocks, the bulk of which are lambed in April, the flock will be brought down at the end of this month, unless lambing is to take place on the high ground. Where flocks are lambed on the lowland, it is a great convenience to red-raddle the rams at tupping time, and thus be able to distinguish the ewes that will lamb first; in this way it is possible to avoid having to bring the whole flock down together for lambing. In-Lamb-Ewe disease is very prevalent on the better grass lands this season. It was expected by many that the prolonged wet weather would have prevented this, but the unusually good condition of the ewes in the autumn, followed by such weather, seems to have been the main cause. Ewes lambing in March are mostly free from this complaint—it is mostly confined to those lambing in the first three weeks of February.

It is false economy not to engage, if necessary, extra help for the lambing. One lamb only, saved each week, will pay for this, and, during particularly severe weather, a man may easily earn his month's

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pay in a day. Men from the uplands can go to farms on lower ground for this work, and then return to their own districts in time for the lambing there.

It is important that dead lambs should be buried as soon as possible, particularly in view of the spread of lamb dysentery. In many districts it has been considered waste of time to bury lambs, and it was customary to throw their carcasses to rot on the hedges; the past tense is used because local authorities in some areas have tried to put an end to this habit. A dried-up lamb carcass was a familiar sight on all hedges in the grass sheep districts—so common that a countryman accepted it as part and parcel of the landscape. Dr. Montgomerie called attention recently to the dangers of this practice. Carrion crows and sea gulls, which are always on the scene as soon as a lamb dies, draw out the intestines of a dead lamb after having pecked at the soft navel. Dr. Montgomerie himself saw a crow carrying in its bill a yard of lamb's intestines from a farm where dysentery was prevalent. The natural place for a crow to alight in such circumstances is a quiet shady spot where it can eat its meal unmolested—such a place is exactly such as a ewe would select for lambing. In discussing the burying of sheep, a warning may be given against the practice of skinning sheep that have died of braxy, as this leads to contamination of the soil by the germs of the disease.

On the Land.—The proportion of land sown in March in North Wales is small, though there are a few districts where the sowing of cereals is often completed before the end of the month. Much potato planting is carried out in England and Wales this month, including earlies not planted in February because of wet weather, or the fear of late frosts.

The potato riddle regulations, though not stringent this season, add interest to the question whether it is advisable to use large tubers for seed. Local conditions may sometimes also direct attention to this question. Thus, in a local organization for growing seed potatoes of special quality, the question was raised as to how the acreage could be increased without incurring the excess-acreage levy. It was pointed

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out that, if no ware were sold, the levy would not have to be paid; the largest tubers could be kept for planting at home, leaving all the seed size for sale.* It is possible that the Seed Potato Growers' Association in Cumberland may also be facing the same problem.

Experiments carried out over a period of three years at the South-Eastern Agricultural College, indicate that, for total yield, large seed of 2 in. to 2½ in. was best, producing about 12½ tons per acre against 11½ tons from the seed of usual size; the large seed also gave a higher yield of ware. It is pointed out, however, that, whereas only 15½ cwt. of normal sized seed was used to the acre, the large seed took 30½ cwt.; the extra cost of the large seed was compensated for in the extra crop. This confirms some of the results of Dr. Salaman, who, some years ago, tested this point with one variety in a trial specially designed for accuracy; the experimenter concluded that "the larger the seed tubers, the greater the gross crop they produce."

A growing body of opinion favours the early sowing of sugar-beet. Thus, a large-scale grower, a prize-winner in a 1935 beet growing competition for crops over 15 acres, writing in *The Farmer and Stockbreeder* last August, expressed his belief in sowing at the end of March or the first few days of April. Careful tests, involving analysis of the roots, must be carried out on different varieties before recommendations could be made on this point; even after such tests recommendations would apply only subject to the possibility of an early or late, a dry or wet season. It is possible that the succession of three dry summers has favoured those sowing early because the plants would thus be enabled to get a good root-hold before the soil became too dry; on the other hand, the earliness of the seasons might have been expected to tell against the very early-sown crops.

For Young Farmers.—It is interesting, in travelling, to observe the different types of vehicles used for transport on the farm—there are almost as many types

* An allowance off the excess-acreage levy is made with potatoes grown on excess acreage that have been sold for seed or exported, see *Potato Marketing Scheme*, 1933, paragraph 82 (b).—Ed.

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as there are dialects. The most primitive type, and a kind still used in hilly, rugged regions, consists mainly of two long poles, with cross bars, made so as to be carried by two men, one at each end. Mr. I. C. Peate, of the National Museum of Wales, likened this to the hand-bier used for burials in some parishes. A user of this type of vehicle in Denbighshire explained that, in rugged country, intersected by valleys and small rivers, even sleds are too advanced for carrying hay.

The next stage in the development of the primitive vehicle was probably the sled, still indispensable on steep sloping ground for the transport of hay, bracken, etc. The sled has the advantage, not only of a low centre of gravity and the consequent small risk of being overturned, but also that braking is not necessary. Apropos of the unsuitability of wheeled implements for mountain country, many tribes in the Caucasus are described as "never having seen a wheel."

From such vehicles, the various types of two-wheeled carts and four-wheeled waggons have developed, giving ample scope for ingenuity and craftsmanship. Those in the Birmingham area who have not had an opportunity of closely examining a farm waggon can be recommended to examine, in the Birmingham Art Gallery and Museum, boxwood models of the Gloucestershire waisted or half-lock type of waggon, and the Hereford, non-waisted harvest waggon. The makers of many of these carts and waggons would probably have been astonished at the long life of their products, many of them repaired to such an extent that little of the original vehicle is left. During the bidding on such a cart at a recent farm sale, the opinion was expressed that "there was none of the original cart left except the space once occupied by it!"

With the most common type of farm cart, having an axle about 3 ft. high, loads of heavy materials, such as bags of corn or manure, have centres of gravity that, though high, are below the level of the horse's back. Fitted with frames for transporting lighter material, these carts have the disadvantage that, owing to the height of the load, the work of loading is heavy; high vehicles however, have an advantage

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when they have to be unloaded to a tall stack, and, in addition, are easily tipped. In south-west and mid-Wales, a type of cart known as the "gambo" is much used for carrying light material, and the users of this type are very enthusiastic over its advantages. This vehicle has a long, fairly low body, with no back board. When light material has to be carted, a long pole, sloping slightly outwards, is fitted at each corner, thus being able to hold together a large load, that has not to be raised very high. The disadvantage of forking to a stack from such a low load is overcome by the use of mechanical unloaders; the "gambo" is admirably suited for work with the grapple type of unloader so prevalent in those parts. The farmers in that part of the country have a very high reputation for the expeditious way in which they handle the hay crop, and the "gambo" can be recommended as the contrivance of a hard working, hard thinking lot of men for transporting light material.

Is the factory-produced, pneumatic-tyred cart now available in various sizes, likely to do away with the picturesque assortment of farm carts? This will probably occur in time on many of the larger farms. The large weight and heavy draught of the ordinary cart appears out of proportion to the load carried. Again, if the pneumatic-tyred cart has solved the difficulty of carting manure in wet weather, then the progress of this type seems the more certain.

NOTES ON MANURING

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The Choice of Nitrogen Fertilizers.—In these notes in the December, 1935, issue of this JOURNAL (p. 947) attention was drawn to the different effects of the various nitrogen fertilizers on the reaction and lime reserves of the soil, and the consequent effects of their use upon the farmer's bill for lime. It was pointed out that the cost of a unit quantity of nitrogen in the several fertilizers can be regarded as a true figure only for those soils where the lime reserves are practically unlimited and where applications of lime are therefore unnecessary. For other soils, where routine liming is essential to the maintenance of fertility, a correction must be made for the effect of the fertilizer in increasing or diminishing, as the case may be, the wastage of the lime reserves.

Two different correspondents have since suggested that it might be useful to show a recalculation of unit costs for the latter type of case, i.e., where the cost of liming is a material consideration. A real calculation can be made, of course, only if the cost of lime, applied to the soil, is known.

In the following table the calculation is hypothetical in so far that it is assumed that the cost of liming is 30s. per ton of pure calcium carbonate, equivalent to 53s. 6d. per ton of pure calcium oxide, which figures might be either more or less than the actual ones, according to the distance of the farm from a source of lime and the transport facilities available. In some instances waste lime or chalk may be available at the cost of cartage. The prices taken for the various fertilizers are those ruling in February, 1936.

The last column of the table, giving the "corrected" cost per unit in each case, indicates the cost of nitrogen after allowance has been made for the effect of the fertilizer on the lime reserves of the soil.

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	Nitrogen Content per cent.	Price per ton (Delivered Station) £ s.	"Correc- tion" with Calcium Carbonate at 30s. per ton		Cost per Unit Nitrogen	
			s. d.		Actual	"Cor- rected" s. d.
Nitrate of soda, granular ..	16.0	7 12	-7 6		9 6	9 0
Nitrate of lime ..	13.0	7 0	-5 7		10 9	10 4
Nitro-chalk ..	15.5	7 5	nil		9 4	9 4
Sulphate of am- monia ..	20.6	7 3	+31 6		7 0	8 6
Calcium cyanamide	20.6	7 2	-16 6		6 11	6 1

It must of course be admitted that the cost of the unit of nitrogen is by no means the only consideration that should guide the farmer in his choice of a particular fertilizer. The season of application, the speed of availability, the "preference" of the particular crop and the nature of the soil must all be taken into account.

"Balance" in Potato Fertilizers.—Experiments on the manuring of potatoes have been carried out in great numbers and over a long period of years, and a number of useful generalizations have been fairly well established.

For instance, it is almost a commonplace that the best results are obtained by combining a moderate dressing of yard manure (or, as an alternative, a crop of green manure or a ploughed-in turf) with a rather heavy dressing of artificials. The latter may vary from perhaps 6 cwt. per acre as an ordinary minimum to about 12 cwt. as an ordinary maximum. Still higher applications may be used with profit where dung is restricted in amount or has perforce to be omitted altogether. Broadly speaking, the higher applications are most likely to pay where the other conditions (soil moisture, sunshine, etc.) allow of a large yield. On shallow soils, or in sunless climates the yield is relatively "inelastic," i.e., it cannot be so easily raised merely by heavier applications of artificials.

There is also substantial agreement about the best form in which to apply each of the nutrients. The phosphate should be in water-soluble form. The pure forms of potash should always be preferred to the

NOTES ON MANURING

crude salts, and sulphate should generally be preferred to muriate—on the ground that it commonly produces a better cooking quality.* Again, partly on the ground of its relative cheapness and partly on account of the plant's "preference," sulphate of ammonia is generally regarded as the most suitable form of nitrogen. The farmer may thus use a mixture of sulphate of ammonia, superphosphate and sulphate of potash, or he may resort to one or other of the concentrated fertilizers. The latter, of course, should be applied in smaller amounts, corresponding to their higher content of plant nutrients.

By far the most difficult thing, in the individual instance, is to strike the best balance between the three nutrients, and here it seems impossible to do more than indicate some general guiding principles.

One contrast that may usefully be drawn is that between the stock farm, or the corn-and-stock farm, where potato growing constitutes a rather minor department, and the other type of holding where a large proportion of the land is under potatoes and other sale crops. On the first of these the potatoes will usually receive a liberal dressing of yard manure. Moreover, the whole system of farming, while tending to deplete the soil's reserves of phosphates, tends also to be nearly self-sufficing as regards both nitrogen and potash. Not only is yard manure "unbalanced" in the sense of being relatively deficient in phosphates, but such phosphate as it contains is in a form that is not readily available to the potato plant. In these circumstances (e.g., in many parts of Ireland, Scotland and West of England) the fertilizer should be relatively high in phosphate and, in the more extreme cases, the dressing may be of the following type:—

	<i>Cwt. per acre</i>			
Sulphate of ammonia	..	..	..	1
Superphosphate	..	..	..	4
Sulphate of potash	..	..	..	1
				6

On similar, medium, soil under the different system of farming and with the usually lighter application

* For the chipping trade a waxy texture is preferred, and hence muriate may be desirable. The sulphate gives the more floury texture.

NOTES ON MANURING

of dung, the phosphate in the artificial need be raised only a little, whereas much more liberal use must be made of nitrogen and potash. A typical dressing might then be :—

	<i>Cwt. per acre</i>			
Sulphate of ammonia	..	..	..	3
Superphosphate	..	..	..	4½
Sulphate of potash	..	..	..	2
				9½

The climate of the area is another consideration, affecting mainly the optimum point of nitrogen application. In the warmer and wetter districts, where damage by blight reaches its maximum, less nitrogen should be used than might otherwise be desirable, for excessive applications produce a luxuriant and soft type of haulm, which falls a very easy prey to the fungus.

On the question of soil type it is less easy to generalize, but it may be taken that light silts and sandy loams require considerably less phosphate and considerably more potash than heavy soils, while on "black top" or organic soils the phosphate requirement reaches its maximum while the nitrogen requirement falls to a minimum. The following figures indicate, in a general way, the changes that would be desirable in the mixture last mentioned, for soils of these various types :—

		<i>Cwt. per acre</i>		
		<i>Sandy</i>	<i>Heavy Loam</i>	<i>Organic</i>
Sulphate of ammonia .. ..	.. ..	3	3	1½
Superphosphate .. ..	.. ..	2½	4½	5½
Sulphate of potash .. ..	.. ..	3	2	2
		8½	9½	9

These figures must be taken in a very general sense, and the farmer should always endeavour to extract information from the results of experiments carried out in his own locality and on soil types comparable with his own. In particular the response to superphosphate is so variable, from one trial to another, that it is extremely difficult to predict its effect on a given field. Indeed, a negative response to superphosphate—i.e., a reduction in the yield—is by no

NOTES ON MANURING

means unknown. It seems that this is sometimes brought about because the excessive supply of phosphate leads to premature ripening of the crop, which is most likely on light soils in the drier areas. There seem, however, to be other instances in which a reduction of the yield cannot be explained on this theory. Blenkinsop* has also shown that the damage from eelworm attack tends to be greatest where there is a high ratio of available phosphate to potash in the soil, and that the effects of an attack may be minimized, on such soils, by very heavy applications of potash.

The foregoing remarks may be taken to apply to maincrop and second early varieties. With first earlies the farmer's object is often a different one—i.e., he is concerned not so much with the question of the mature yield of the crop but rather with the date at which the tubers will reach marketable size. Where it is hoped to market in June or July it is not unusual for dressings of 4–5 cwt. of sulphate of ammonia and 5–6 cwt. of superphosphate to be used along with the more normal amount of 2–2½ cwt. of sulphate of potash.

* See this JOURNAL, March, 1935, p. 1187

NOTES ON MANURING

PRICES OF ARTIFICIAL MANURES

Description	Average prices per ton during week ended Feb. 19				
	Bristol	Hull	L'pool	London	Cost per Unit at London
Nitrate of Soda (N. 15½%) ..	£ s. 7 12d	£ s. 7 12d	£ s. 7 12d	£ s. 7 12d	s. d. 9 10
" " Granulated (N. 16%) ..	7 12d	7 12d	7 12d	7 12d	9 6
Nitrate of Lime (N. 13%) ..	7 0d	7 0d	7 0d	7 0d	10 9
Nitro-Chalk (N. 15½%) ..	7 5d	7 5d	7 5d	7 5d	9 4
Sulphate of Ammonia:—					
Neutral (N. 20.6%) ..	7 3d	7 3d	7 3d	7 3d	7 0
Calcium Cyanamide (N. 20.6%)	7 2e	7 2e	7 2e	7 2e	6 11
Kainite (Pot. 14%) ..	2 18	2 15	2 15	2 15	3 11
Potash Salts (Pot. 30%) ..	4 18	4 15	4 13	4 15	3 2
" " (Pot. 20%) ..	3 15	3 12	3 10	3 12	3 7
Muriate of Potash (Pot. 50%)	7 18	7 16	7 12	7 16	3 1
Sulphate " " (Pot. 48%)	9 8	9 6	9 2	9 6	3 10
Basic Slag (P.A. 15½%) ..	2 10c	2 0c	..	2 6c	2 11
" " (P.A. 14%) ..	2 6c	1 16c	1 16c	2 3c	3 1
Grd. Rock Phosphate (P.A. 26-27½%) ..	2 10a	2 5a	2 8a	2 5a	1 8
Superphosphate (S.P.A. 16%)	2 19	..	2 19f	2 16g	3 6
" (S.P.A. 13½%)	2 15	2 13	2 15f	2 12g	3 10
Bone Meal (N. 3½%, P.A. 20½%)	..	6 17	6 5h	6 0	..
Steamed Bone Flour (N. ½%, P.A. 27½-29½%) ..	5 12	5 10	5 2h	5 2	..

Abbreviations: N. = Nitrogen; P.A. = Phosphoric Acid;

S.P.A. = Soluble Phosphoric Acid; Pot. = Potash.

* Prices are for not less than 6-ton lots, at purchaser's nearest railway station, unless otherwise stated. Unit values are calculated on carriage paid prices.

† Prices are for not less than 2-ton lots, nett cash for prompt delivery f.o.r. in town named, unless otherwise stated. Unit values are calculated on f.o.r. prices.

a Prices for 4-ton lots f.o.r. Fineness 85% through standard sieve.

c Prices for 6-ton lots. At Bristol, f.o.r. Bridgwater; at Hull and Liverpool f.o.r. neighbouring works, and at London f.o.r. depots in London district. Fineness 80% through standard sieve.

d For lots of 4 tons and under 6 tons the price is 1s. per ton extra, for lots of 2 tons and under 4 tons 5s. per ton extra and for lots of 1 ton and under 2 tons 10s. extra.

e Delivered in 4-ton lots at purchaser's nearest railway station. For lots of 2 tons and under 4 tons the price is 5s. per ton extra, for lots of 1 ton and under 2 tons 10s. per ton extra, for lots of 10 cwt. and under 1 ton 15s. extra, and for lots of less than 10 cwt. but not less than 2 cwt. 20s. extra.

f Prices shown are f.o.r. Widnes.

g Prices shown are f.o.r. northern rails; southern rails 1s. 3d. extra.

h Prices shown are f.o.r. Applay Bridge.

NOTES ON FEEDING

W. B. MERCER, M.C., B.SC., (Principal) and
Colleagues,

Cheshire School of Agriculture.

The Jig-Saw Puzzle.—We have it on the authority of an Eastern sage (and Fitzgerald) that life is all a chequer board of nights and days. An industry like farming resembles more closely a jig-saw puzzle. When the scientist turns his attention to it, his first impulse is to pull it to pieces, in order that the individual units may be examined in detail. The bulk of our technical literature is made up of the results of such detailed studies. Sometimes the pieces are turned over and over so often, and scanned so closely that even the analyst who originally pulled the puzzle to pieces forgets how it fits together, while laymen reading the records of his observations may be forgiven if they regard the much-discussed piece as the whole puzzle.

Something of this kind has happened over rationing of dairy stock. The central theme—that cows should be fed according to their yield—is without doubt sound science and equally sound practice; but in fitting it into the puzzle of dairy farming care must be taken that certain neighbouring pieces, which have to do with body weight, health, and manurial residues, are not lost.

Meat Value of Dairy Stock.—The immense value of the milk produced by a good dairy cow ought not to blind us to the fact that a cow produces also meat; poor meat it is true, but none the less meat. A £24 Shorthorn heifer represents an investment of £14 in meat, and £10 in milk, the former being a relatively safe, the latter in the nature of a speculative investment.

In the dairy breeds, the proportions are different, the amount allowable as beef value being very small. Milk values fluctuate very rapidly according to the stage of lactation, beef values less violently, but still considerably according to condition and age. In feed-

NOTES ON FEEDING

ing a Shorthorn cow, therefore, some thought must at all times be given to beef value. In ordinary circumstances about one-third of the cattle in a herd are jettisoned annually, and since the decision to draft a cow is generally made about four months before she is sold, it follows that at all times something like one-ninth of the stock is on the draft list.

Feeding cows for sale as beef at 25s. per cwt. is, on the face of it, not an attractive proposition; were it the case that all food not utilized for maintenance or milk is wasted, it would be an utterly hopeless proposition. In reality a cow does not waste all food supplied in excess of her milk production requirements. Some of the balance, if there is a balance, is used for fattening.

Practically all dairy farmers endeavour to prepare draft cows for sale during the last stages of their lactation. The argument in support of the practice does not hang entirely on the economy in food; considerations of stall space and milk income enter into it. Nevertheless, the argument that food is saved by this practice is without doubt sound. Calculation of costs and returns, "profits" or "losses," on the feeding off of draft cows is hampered by a grievous shortage of statistical material. The rate of increase in weight of cows placed under "milk and feed" conditions varies greatly according to type and individuality of the animals; so also does the food required per lb. of increase. Probably most draft cows make poor use of the fattening ration provided.

A further complication arises from the variation in selling prices. "Fat" cows sell at anything from 25s. per cwt. down to 10s. A casual record made in a local auction recently showed that fresh youngish cows were making 23s. 6d. per cwt. while leaner cows were making only 20s., and aged beasts only 13s. 6d. With this class of stock there is normally a marked rise in values per cwt. as feeding proceeds, and allowance must be made for appreciation in any attempt to state a profit and loss account. Taking an average case, one might hazard the following statement of the economic position of cow-feeding in winter:—

NOTES ON FEEDING

	£	s.	d.		£	s.	d.
Initial value, 10 cwt. at 20s.	10	0	0	Milk—			
4 months' maintenance, at 7s. per week	5	19	0	150 gal. at 1s. ..	7	10	0
4 months' milk production rations, 6 cwt. at 8s. ..	2	8	0	Final value—			
4 months' fattening rations, 6 cwt. at 7s.	2	2	0	11½ cwt. at 25s.	14	1	0
	£20	9	0		£21	11	0

Calculations of losses on drafts are of peculiar interest at the present moment by reason of their bearing on the problem of non-tubercular herds. Judging by inquiries that reach us, this problem often involves a reconsideration of the breed to be kept. Is it advisable to continue with Shorthorns, or to start afresh with a pure dairy breed? The question is more easily asked than answered. On the one hand the dairy breeds can generally be relied upon to give more milk, but their capital cost is higher, and since a high rate of discard in the early years at least is to be anticipated, one must budget for heavy losses on cow flesh. The loss per cow on drafts is much heavier with dairy breeds than with Shorthorns. At Reaseheath for instance, the average sale value of draft Ayrshires during the past 3 years has been only £7, that of Shorthorns over £13.

Manurial Residues.—Very closely connected with feeding is the subject of manurial residues, though most people contrive to remember or forget the connexion, just as it suits them. No landlord is likely to forget it at any time; but once the ingoing is paid the tenant is apt to regard it as of theoretical consequence only—at any rate until near the end of his tenancy.

Stock farming is popularly regarded as a means of raising the level of fertility of a farm, owing to the importation of the feeding stuffs upon which the stock are partly maintained. There seems very little doubt that, by comparison with arable systems, all types of stock keeping tend to conserve fertility; while some stock—pigs and poultry for instance—often result in a net gain of manurial constituents, since they may be fed entirely on purchased concentrates. The case

NOTES ON FEEDING

of the dairy cow, however, is different. At least half her food is ordinarily derived from the farm, and everyone who has studied the question agrees that the wastage of food residues in winter time is high.

WE have endeavoured, as a matter of interest, to construct a table of losses and gains of plant food arising from cowkeeping on our own farm, using several different methods of computation, but by no method have we arrived at a net gain. The chief difficulty in utilizing the published tables of residual values lies in the assessment of the return during the grazing period. Clearly the losses during this period are very much smaller than in the winter months. In the following calculation we have assumed that three-quarters of the manurial contents of the foods consumed during the summer are returned to the soil; the residues from winter feeding are calculated according to the method recommended in 1927 by the Joint Committee appointed by the Ministry of Agriculture to review the problem of residual values.*

ANNUAL LOSSES AND GAINS IN MANURIAL CONSTITUENTS.

<i>Per Cow</i>	<i>N</i> (lb.)	<i>K₂O</i> (lb.)	<i>P₂O₅</i> (lb.)
<i>Losses (in foods consumed)</i>			
Grass (say) 8 tons	100	116	28
Hay, 21 cwt.	36	42	12
Kale and roots, 32 cwt.	12	17	6
	148	175	46
<i>Gains (residues of foods consumed)</i>			
Grass, 8 tons	75·0	87·0	21·0
Concentrates during grazing, 5·8 cwt.	11·7	3·7	5·5
Hay, 21 cwt. $\frac{3}{4}$ of N. $\frac{1}{4}$ P. and K.	9·6	21·0	6·0
Kale and roots, 32 cwt.	3·2	8·5	3·0
Concentrates during winter 23·6 cwt.	19·3	9·3	13·7
	115·8	129·5	49·2
<i>Net Gain or Loss</i>	-32·2	-45·5	+3·2

On this basis, then, every cow kept results in a direct loss of about 1½ cwt. nitrate of soda and 3 cwt. kainit per annum—equivalent on the farm in question to about half these quantities per acre. It may well be that the nitrogen losses are more than made good

* This *Journal*, Vol. XXXIV, p. 401.

NOTES ON FEEDING

by the clover in the pastures, but it is clear that the cows themselves, despite the heavy purchases of concentrates, remove more than they return. The net losses, however, are small by comparison with those involved when a wheat crop is removed.

Health.—The exact connexion between health and feeding is obscure. That much ill health is attributable to imperfect feeding cannot be doubted; unfortunately it is not possible to follow this assertion with a statement of what constitutes perfect feeding. The past twenty years have borne witness to the marvellous capacity of cows for converting foodstuffs into milk; the past ten years to the price that is paid in herd wastage; to-day the prime question in feeding for yield is, "What yield do I want?" rather than "What yield can I make her give?" Even apart from the possible effect of high yields on health, it is by no means certain that a very high peak yield results in a correspondingly high lactation yield. Many a Shorthorn that "comes down" at five gallons can be raised to six by additional feeding, but it is doubtful whether the lactation total increases proportionately.

Much of the disease and defect in herds arises from causes unconnected or only remotely connected with feeding—some indeed from causes so seemingly fortuitous as to set science at defiance. It is at times extremely difficult to account even for tuberculosis.

Experience with non-tubercular herds does, however, encourage us to believe that the steps taken to avoid this particular disease reduce also the incidence of some other troubles, so that the average selling value of drafts is raised. Experience suggests too, that a distinction should be drawn between young stock and mature cows in selling reactors. Purchase of a reactor cow is not very much more risky than purchase of an untested cow. A reactor calf or stirk is another matter altogether. Her expectation of life cannot be put at more than a few months.

Vale.—This word, we understand, is Latin for good-bye; so we put it at the head of the paragraph to signify that this is the last of our series of Notes on

NOTES ON FEEDING

Feeding. Readers must not infer that the Editor has told us to stop. No. The trouble is the Fourth Commandment.

[As Mr. Mercer's concluding note intimates, this is the last of the articles that he and his colleagues are contributing in this series. The Ministry desires to express its cordial appreciation of their valued services in the conduct of these notes since July, 1934. From the next (April) issue of the Journal onwards, the "Notes on Feeding" will be contributed by Dr. Charles Crowther, Principal of the Harper Adams Agricultural College, Newport, Shropshire.]

PRICES OF FEEDING STUFFS

Description	Price per ton		Manu-rial value per ton		Cost of food value per ton		Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Protein equiv.
	£	s.	£	s.	£	s.		s.	d.	%
Wheat, British ..	6	8	0	8	6	0	72	1	8	9.6
Barley, British feeding ..	5	10	0	8	5	2	71	1	5	6.2
" Canadian, No. 3, ..										
Western ..	5	08	0	8	4	12	71	1	4	6.2
Persian ..	5	10	0	8	5	2	71	1	5	6.2
Russian ..	5	10	0	8	5	2	71	1	5	6.2
Oats, English, white ..	6	3	0	8	5	15	60	1	11	7.6
" " black ..										
and grey ..	6	0	0	8	5	12	60	1	10	7.6
Scotch, white ..	6	12	0	8	6	4	60	2	1	7.6
Canadian, No. 2, ..										
Western ..	7	5*	0	8	6	17	60	2	3	7.6
Canadian, No. 3, ..										
Western ..	6	8†	0	8	6	0	60	2	0	7.6
Canadian, ..										
mixed feed ..	5	17	0	8	5	9	60	1	10	7.6
Maize, Argentine ..	4	7	0	6	4	1	78	1	0	7.6
Danubian ..										
Gal. Fox ..	4	3†	0	6	3	17	78	1	0	7.6
South African, ..										
No. 4, yellow flat ..	4	7†	0	6	4	1	78	1	0	7.6
South African, ..										
No. 2, white flat ..	4	10†	0	6	4	4	78	1	1	7.6
Beans, English, ..										
Winter ..	5	158	0	16	4	19	66	1	6	19.7
Peas, English, Blue ..	9	08	0	14	8	6	69	2	5	18.1
Japanese ..	19	10†	0	14	18	16	69	5	5	18.1
Dari ..	6	10†	0	7	6	3	74	1	8	7.2
Milling Offals—										
Bran, British ..	6	0	0	15	5	5	43	2	5	9.9
broad ..	6	10	0	15	5	15	43	2	8	10.0
Middlings, fine, ..										
imported ..	5	17	0	12	5	5	69	1	6	12.1
Weatings† ..	5	17	0	13	5	4	56	1	10	10.7
superfine† ..	6	10	0	12	5	18	69	1	9	12.1
Pollards, imported ..	5	10	0	13	4	17	50	1	11	11.0
Meal, barley ..	6	17	0	8	6	9	71	1	10	6.2
" grade II ..	6	2	0	8	5	14	71	1	7	6.2
maize ..	5	2	0	6	4	16	78	1	3	7.6
" South ..										
African ..	4	17	0	6	4	11	78	1	2	7.6
" germ ..	5	2	0	10	4	12	84	1	1	10.3
locust bean ..	7	15	0	5	7	10	71	2	1	3.6
bean ..	8	0	0	16	7	4	66	2	2	19.7
fish (white) ..	14	15	2	0	12	15	59	4	4	53.0
Maize, cooked, flaked ..	5	11	0	6	5	5	84	1	3	9.2
gluten feed ..	5	5	0	12	4	13	76	1	3	19.2
Linseed cake—										
English, 12% oil ..	8	0	0	19	7	1	74	1	11	24.6
" 9% " ..	7	10	0	19	6	11	74	1	9	24.6
" 8% " ..	7	5	0	19	6	6	74	1	8	24.6
" 6% " ..	7	128	0	19	6	13	74	1	10	24.6

PRICES OF FEEDING STUFFS

Description	Price per ton	Manu- rial value per ton	Cost of food value per ton	Starch equiv. per 100 lb.	Price per unit starch equiv.	Price per lb. starch equiv.	Pro- tein equiv.
	£ s.	£ s.	£ s.		s. d.	d.	%
Soya-bean cake, 5½% oil ..	8 2½	1 7	6 15	69	1 11	1.03	36.9
Cottonseed cake, English, Egyptian seed, 4½% oil ..	4 12	0 17	3 15	42	1 9	0.94	17.3
Cottonseed cake, Egyptian, 4½% oil	4 6	0 17	3 9	42	1 8	0.89	17.3
Cottonseed cake, decorticated, 7% oil	7 0†	1 6	5 14	68	1 8	0.89	34.7
Cottonseed meal, decorticated, 7% oil	7 2†	1 6	5 16	70	1 8	0.89	36.8
Coconut cake, 6% oil	6 5	0 17	5 8	77	1 5	0.76	16.4
Ground-nut cake, decorticated 6-7% oil	7 7	1 6	6 1	73	1 8	0.89	41.3
Ground-nut cake, imported decorti- cated, 6-7% oil ..	6 15	1 6	5 9	73	1 6	0.80	41.3
Palm-kernel cake, 4½-5½% oil. .	6 2†	0 11	5 11	73	1 6	0.80	16.9
Palm-kernel cake, meal, 4½% oil ..	6 0†	0 11	5 9	73	1 6	0.80	16.9
Palm-kernal meal, 1-2% oil ..	5 12	0 11	5 1	71	1 5	0.76	16.5
Feeding treacle ..	4 12	0 8	4 4	51	1 8	0.89	2.7
Brewers' grains, dried ale ..	4 15	0 10	4 5	48	1 9	0.94	12.5
Brewers' grains, dried porter ..	4 7	0 10	3 17	48	1 7	0.85	12.5
Dried sugar-beet pulp (a)	5 5	0 5	5 0	66	1 6	0.80	5.2

(a) Carriage paid in 5-ton lots.

* At Bristol.

§ At Hull.

† At Liverpool.

‡ In these instances manurial value, starch equivalent and protein equivalent are provisional.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of January, 1936, and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative values of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, if linseed cake is offered locally at £10 per ton, then since its manurial value is 19s. per ton as shown above, the cost of food value per ton is £9 1s. Dividing this figure by 74, the starch equivalent of linseed cake as given in the table, the cost per unit of starch equivalent is 2s. 3d. Dividing this again by 22.4, the number of pounds of starch equiva-

FARM VALUES OF FEEDING STUFFS

lent in one unit, the cost per lb. of starch equivalent is 1·29d. Similar calculations will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own markets. The figures given in the table under the heading manurial value per ton are calculated on the basis of the following unit prices :—N, 6s. 10d. ; P_2O_5 , 2s. 1d. ; K_2O , 3s. 4d.

FARM VALUES OF FEEDING STUFFS

The prices in respect of the feeding stuffs used as bases of comparison for the purposes of this month's calculations are as follows :—

	<i>Starch equivalent Per cent.</i>	<i>Protein equivalent Per cent.</i>	<i>Per ton £ s.</i>
Barley (imported)	71	6·2	5 7
Maize	78	7·6	4 7
Decorticated ground-nut cake ..	73	41·3	7 1
„ cottonseed cake ..	68	34·7	7 0

(Add 10s. per ton, in each instance, for carriage.)

The cost per unit starch equivalent works out at 1·29 shillings, and per unit protein equivalent, 1·56 shillings. An explanation of the method of calculation employed is given in the Report of the Departmental Committee on Rationing of Dairy Cows.*

The table is issued as a guide to farmers respecting the feeding value of their crops in relation to current market prices. (The " food values," which it is recommended should be applied by Agricultural Organizers and other advisers in connexion with advisory schemes on the rationing of dairy cows, are given in the December, 1935, issue of the Ministry's JOURNAL, p. 955.)

FARM VALUES

Crop	Starch equivalent Per cent.	Protein equivalent Per cent.	Food value per ton, on farm £ s.
Wheat	72	9·6	5 8
Oats	60	7·6	4 9
Barley	71	6·2	5 1
Potatoes	18	0·8	1 4
Swedes	7	0·7	0 10
Mangolds	7	0·4	0 10
Beans	66	19·7	5 16
Good meadow hay ..	37	4·6	2 15
Good oat straw ..	20	0·9	1 7
Good clover hay ..	38	7·0	3 0
Vetch and oat silage ..	13	1·6	0 19
Barley straw	23	0·7	1 11
Wheat straw	13	0·1	0 17
Bean straw	23	1·7	1 12

* Obtainable from H.M. Stationary Office, Adastral House, Kingsway, W.C.2, price 6d., post free 7d.

MISCELLANEOUS NOTES

The Agricultural Index Number

THE general index number of prices of agricultural produce for January was 119 (base 1911-13=100), i.e., 5 points higher than in December, 1935, and 2 points above that recorded a year ago. (If allowance be made for payments under the Wheat Act, 1932, and the Cattle Industry (Emergency Provisions) Act, 1934, the revised general index for the month under review is advanced to 125.) Wheat, fat cattle, bacon pigs and potatoes are the principal commodities which have risen in price compared with December, but barley, dairy cows, store cattle, pork and store pigs and eggs have declined.

*Monthly index numbers of prices of Agricultural Produce
(Corresponding months of 1911-13=100)*

Month	1931	1932	1933	1934	1935	1936
January ..	130	122	107	114	117	119
February ..	126	117	106	112	115	..
March ..	123	113	102	108	112	..
April ..	123	117	105	111	119	..
May ..	122	115	102	112	111	..
June ..	123	111	100	110	111	..
July ..	121	106	101	114	114	..
August ..	121	105	105	119	113	..
September ..	120	104	107	119	121	..
October ..	113	100	107	115	113	..
November ..	112	101	109	114	113	..
December ..	117	103	110	113	114	..

Grain.—Wheat at an average of 6s. 3d. per cwt. was 7d. higher than in the previous month and the index rose by 8 points to 85. (If “ deficiency payments ” under the Wheat Act, 1932, be taken into account the figure is 127.) Barley at 8s. 1d. per cwt. declined by 2d., but owing to a somewhat larger drop in price having taken place in the corresponding months of the base period, the index moved upwards from 100 to 101. The average of oat prices advanced from 5s. 10d. to 5s. 11d. per cwt., the index appreciating by 4 points to 87. In January, 1935, wheat averaged 4s. 9d. per cwt., oats 6s. 10d. per cwt.,

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and barley was at the level of the month under review, the indices being 65, 100 and 101 respectively.

Live Stock.—Fat cattle values were higher on the month, the average of 32s. 11d. per live cwt. for second quality being 5d. above that for December and 7d. more than in January last year. The index at 97 shows an increase of 6 points—2 points above that recorded a year ago. The effect of adding the cattle subsidy raises the index to 111. Fat sheep were unaltered in price, but as a decline had occurred during the base period the index advanced from 119 to 127. Baconers appreciated by 4d. to 10s. 2d. per score, the index rising by 9 points to 107. Porkers, dairy cows and store cattle were easier in price, but as the fall in January of the base years had been greater, the indices were higher in all three instances. Quotations for store sheep at 38s. 9d. per head were maintained at last month's levels, but those for store pigs declined from 28s. 7d. to 28s. 1d. per head; on account of reverse movements of prices, however, during the base period, the index for sheep dropped 1 point to 105, while that for pigs rose from 131 to 134.

Dairy and Poultry Produce.—Regional contract prices of milk remained unaltered between December and January and the index was again 171. Farm butter was cheaper by $\frac{1}{4}$ d. per lb., but the index remained unchanged at 93. A reduction of 4½d. per dozen in the price of eggs was less marked than the reduction had been in the base period, and the index moved upwards by 5 points to 115. Cheese and poultry (except geese) appreciated in price, the index for the former commodity advancing from 87 to 93, while the combined index for poultry rose by 7 points to 127.

Other Commodities.—Quotations for potatoes increased on the average by 21s. 6d. to £7 14s. per ton, resulting in a sharp rise of 16 points in the index to 201. All kinds of hay were slightly dearer, but the combined index showed a decline of 1 point to 83 owing to influence of the base period.

Wool was a little firmer in value, the index appreciating from 91 to 96. Vegetables averaged almost twice the price recorded during 1911-13.

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*Monthly index numbers of prices of individual commodities.
(Corresponding months of 1911-13 = 100.)*

Commodity	1934	1935				1936
	Jan.	Jan.	Oct.	Nov.	Dec.	Jan.
Wheat	59	65	80	78	77	85
Barley	117	101	110	101	100	101
Oats	80	100	89	87	83	87
Fat cattle ..	106	95	92	92	91	97
„ sheep ..	117	140	121	120	119	127
Bacon pigs ..	125	117	90	93	98	107
Pork „ ..	136	128	99	103	110	115
Dairy cows ..	105	105	107	103	104	105
Store cattle ..	90	87	90	90	92	94
„ sheep ..	93	111	120	112	106	105
„ pigs ..	163	151	124	129	131	134
Eggs	97	95	118	109	110	115
Poultry	115	121	117	118	120	127
Milk	166	171	171	171	171	171
Butter	92	83	95	97	93	93
Cheese	114	97	82	87	87	93
Potatoes	104	121	152	160	185	201
Hay	79	101	91	84	84	83
Wool	95	88	89	91	91	96

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	130*	118*	126	124	127	127
Fat Cattle ..	—	110	107	106	105	111
General Index ..	119	124*	120	119	121	125

* Superseding figures previously published.

The Agricultural Produce Index Number for 1935

THE recovery shown in 1934 prices of agricultural produce generally as compared with those of 1933 was maintained in 1935. The improvement was not quite so pronounced, however, the index number being 117 (on a base of 1911-13=100) against 114 for the preceding year and 107 in 1933. Nevertheless, the fact that ground was gained once more is reassuring. Moreover, these index numbers do not represent the full return to the farmer inasmuch as subsidies are payable under the Wheat Act, 1932, and the Cattle Industry (Emergency Provisions) Act, 1934. If allowance be made for these subsidies the general index is advanced to 123 as against 119 for 1934 and 111 for 1933.

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Wheat and oats, potatoes, fodder beans and fruit, milk, butter, poultry and eggs all shared in the general rise of prices, but fat sheep, wool and hay remained stationary, while fat stock, apart from sheep, declined. For cattle of this category it was the fifth consecutive year of diminishing values. Barley, cheese and vegetables also met poorer markets.

The differences for fifteen items as between 1934 and 1935, are set out below :—

<i>Increases</i>				<i>Decreases</i>			
			%				%
Wheat	..	..	6	Barley	..	..	8
Oats	..	..	7	Fat cattle	..	..	8
Potatoes	..	..	12	Pigs, baconers	..	..	8
Milk	..	..	8	" porkers	..	..	9
Butter	..	..	2	Cheese	..	..	14
Poultry	..	..	3	Vegetables	..	..	4
Eggs	..	..	7				
Fruits	..	..	52				
Beans	..	..	9				

Grain.—The year opened with home-grown wheat at 4*s.* 9*d.* per cwt.—5*d.* more than in January of 1934. Though only moderate, the increased price promised well, and except for a setback immediately following the seasonal rise to 5*s.* 6*d.* in June-July, was improved upon in the last months of the year. The average price for the twelve months came out at 5*s.* 2*d.*, which was 4*d.* higher than in 1934. The index (68) showed an advance of 4 points and, if deficiency payments under the Wheat Act of 1932 also be taken into account, the figure stands at 118. Barley fell consistently from 8*s.* 2*d.* per cwt. at the beginning of the year to 6*s.* 7*d.* per cwt. in July, and the seasonal rise in the autumn, which was only moderate, was followed by a gradual relapse to 8*s.* 3*d.* per cwt. in December. The average for the twelve months was 7*s.* 11*d.*, one which has occurred in four of the years since 1929 and which, being equivalent to that of 1911–13, is represented by the index of 100. Oats opened at 6*s.* 10*d.* per cwt., the highest price since August, 1932, and remained round that figure until April. The next three months witnessed rises of 4*d.*, 6*d.* and 9*d.* respectively on this figure, but quotations dropped to 6*s.* 5*d.* in August and continued on a down grade to 5*s.* 10*d.* at the close of 1935. The average for the whole year proved to be 6*s.* 8*d.*, with an index

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equivalent of 94, and this compares favourably with those of recent years except 1932.

Fat Stock.—The trend of fat cattle prices was similar to that of 1933 and 1934 in following a downward movement for the first three months, but there was a recovery in April and values rose to a peak about June, falling away again in autumn, thus conforming more to normal years. The movements of quotations for fat sheep and pigs were on the whole customary.

With fat cattle selling at the very low figure of 32s. 4d. per live cwt. for second quality in January, and prices then following the path described above with a maximum of only 33s. 8d. in the summer, the average for the year ran out at only 31s. 10d. This was definitely below pre-war and is represented by the index figure of 91—8 points below that of 1934.

If allowance be made for payments of 5s. per live cwt. under the Cattle Industry Act the index is raised to 106. The average value of fat sheep at 9½d. per lb. (2nd quality), was the same as in 1934, with an index figure of 127. The improvement noted in markets since 1932 was, therefore, just maintained, though seasonal variations last year were of greater range than in 1934, the highest price being 11½d. in March as against 11¼d. in the previous May, and the lowest 8¼d. in the autumn as compared with 9d. some twelve months before. As regards pigs it was noted in the *Agricultural Market Report* of January 18th, 1935, that 1934 might have been expected to show a peak in the price "cycle," and that the latter was probably entering upon a down grade. This suggestion proved correct for baconers and porkers alike. The second quality grade of the former were being disposed of at 11s. 1d. per score on the average last January, and prices, after rising to 11s. 8d. in the following month, declined almost steadily to 9s. 3d. in October. There was a slight improvement in November, and an advance to 9s. 10d. in December, but the year's average proved to be 10s. 4d., with an index figure of 103 as compared with 11s. 3d. and 112 respectively for 1934. Second quality porkers started the year at 2s. 2d. per score more than bacon pigs, but depreciated consistently to a common level of 10s. in July, and then improved without relapse to 12s. per score

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for December. The twelve months mean was 11s. 6d., with an index of 109, whereas the price in the previous year had averaged 12s. 8d., with an index of 120.

Dairy and Poultry Produce.—The wholesale contract selling price of liquid milk ruled higher than in 1934 for nine months out of the twelve. Moreover, for two of these, viz., April and September, the Milk Marketing Board put the contracts on a winter instead of summer level, so that the relative index figures for these months were considerably enhanced, i.e., to 215 as against 168 in the preceding year. The effect of this factor, coupled with the general improvement noted, was to advance the annual index from 163 in 1934, to 176 in the year under review. Prices of farm butter started at 12s., and improved slightly for the first quarter of the year, but declined normally to June and then rose steadily to 14s. per 12 lb. by December. The year's average was 12s., and 3d. higher than in 1934, so that the index of 89 had risen by 2 points. Cheese realized markedly less money, making only 65s. 6d. per cwt., as against 76s. in 1934, 82s. in 1933, and 93s. 6d. in the year before that. The index has fallen many points in 4 years, viz., from 127 down to 89. Egg quotations, with an unusual setback in late summer, repeated the trend evidenced in 1934, but on the whole they were firmer, and the twelve months' average for 1935 at 12s. 6d. per long hundred—9d. above that of the previous year—the index showing a 7 point rise to 109. The combined index for poultry was higher at 124 as compared with 120 in 1934.

Other Commodities.—Potato prices for January were at a higher level in 1935 than in either of the two preceding years. After a slight normal fall they rose to 185s. per ton in July—33s. 6d. more than in the peak period of 1934—following which, of course, the main crop depressed quotations to about 110s. The yield, however, was below the average, and a recovery occurred in November which became definite in December, the price for that month averaging 132s. 6d. The mean price for the whole year was 105s., an advance of 11s. on that of 1934, and the index proved to be 133 as against 119. Fruit, with an index number of 196, may be said to have been much

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more valuable than in most recent years. It showed a marked advance on 1934, for which the index was only 129. All kinds of fruit appreciated in price, but apples and plums contributed mainly to the enhanced index. The combined index for vegetables, at 137, was 6 points lower than in 1934, values of cabbages, carrots and onions being deciding factors.

The index for hay, viz., 97, was the same as in 1934 and was higher than in any other year since 1930. The crop of 1935 was secured in very good condition, and production of both clover and meadow hay was well above that of 1934. Movements of prices were almost exactly contrary to one another in these two years, depreciation proceeding steadily as 1935 advanced. Quotations of beans (for fodder) appreciated from a 1934 index of 77 points to 84. Wool values, as ascertained from country wool sales, remained firm at an index figure of 80.

Index Numbers of Agricultural Produce during the Years 1930 to 1935. (Mean of the three years, 1911-13=100.)

Commodity	1930	1931	1932	1933	1934	1935
Wheat	105	76	78	70	64	68
Barley	100	100	96	100	109	100
Oats	87	88	99	80	88	94
Fat cattle ..	133	122	115	101	99	91
Fat sheep ..	160	133	97	110	127	127
Pigs, baconers ..	153	107	91	102	112	103
" porkers ..	165	123	98	109	120	109
Hay	118	86	69	70	97	97
Potatoes	96	188	197	104	119	133
Milk	161	147	144	150	163	176
Butter	128	111	102	94	87	89
Cheese	130	116	127	111	103	89
Poultry	147	144	128	126	120	124
Eggs	136	116	109	105	102	109
Fruit	117	132	180	143	129	196
Wool	82	52	45	66	80	80
Beans	100	74	76	72	77	84
Vegetables ..	138	140	153	141	143	137
Hops	47	77	99	173	101	105*
General Index	134	120	112	107	114	117

Revised index numbers due to payments under the Wheat Act and the Cattle Industry (Emergency Provisions) Act.

Wheat	—	—	100	128	121	118*
Fat Cattle ..	—	—	—	—	104	106
General Index ..	—	—	114	111	119	123*

* Provisional.

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Wireless Talks to Farmers, March, 1936

Station	Date	Time: p.m.	Speaker	Subject
National	11, 18, 24	7.5	Prof. J. A. Scott Watson and others	For Farmers only.
Midland	6	8.0	Various*	"Man and the Land"
	16	6.30	Mr. Walter Pitchford	Our Country Correspondent: Northants
	19	6.30	Mr. W. B. Thompson (Midland), Mr. Peter Fitzpatrick (Ulster), and Mr. W. B. Mercer (North)	Joint discussion: "Irish Store Cattle"
	21	7.30	Various†	Debate: "Producer v. Distributor"
North ..	6	6.30	Mr. W. B. Mercer with Messrs. H. P. Hamilton and G. B. Redcliffe, (Cheshire farmers)	For Northern Farmers: Breeding Dairy Stock
West ..	12, 26	6.30	Mr. A. W. Ling	For Western Farmers
	17	9.5	Various	Village Opinion: (4)
	19	7.30	Mr. F. W. Harvey	Gunter's Farm: (4) The story of a farming family
Scottish	12	6.30	Messrs. J. F. Duncan and James Ticken	"Unemployment Insurance in Agriculture": A discussion
	19	6.30	Mr. J. F. Duncan	For Scottish Farmers
	26	7.10	Mr. Ian Sandison	Management of a Black-face Flock
Northern Ireland	20	5.15	Mr. Peter Fitzpatrick	Farmers Work and Worry
	27		Sir Basil Brooke, Minister of Agriculture, N.Ireland	For Ulster Farmers

* "Man and the Land": A discussion on the right use and destiny of the British countryside, having regard to the conflicting claims of Town and Country, and the present large-scale industrial unemployment. Speakers: Mr. S. L. Bensusan, who has been broadcasting the Midland Station series, "Back to the Land"; Mr. C. S. Orwin, Director, Agricultural Economics Research Institute, Oxford University; Professor R. G. Stapledon, Director of the Imperial Bureau of Plant Genetics (Herbage Plants), and of the Welsh Plant Breeding Station, Aberystwyth; Mr. A. P. McDougall, Managing Director, Midland Marts, Banbury; and a Chairman (not yet settled).

† "Producer v. Distributor": Mr. S. L. Bensusan will propose the motion: "That the present system of distribution of meat, fruit and

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vegetables penalizes producer and consumer." He will contend that, in consequence of too many middlemen, there is an excessive margin between the farmer's return and the price that the housewife has to pay in the shop, and that market rings are still active in many places. Mr. Alfred Woodall, Chairman of the Avoncroft College for Rural Workers, will second the motion, and will speak chiefly as a Worcestershire grower of fruit and vegetables. The distributor will be defended by Mr. A. P. McDougall, of Prescote Manor, near Banbury. Mr. Martin Cowley, well known in the fruit and vegetable trade in Liverpool and district, will reply to Mr. Woodall.

Farm Workers' Minimum Rates of Wages:—A meeting of the Agricultural Wages Board was held at King's Buildings, Smith Square, London, S.W. 1, on Tuesday, February 18, 1936, Mr. W. B. Yates, C.B.E., J.P., presiding.

The Board considered notifications from Agricultural Wages Committees of decisions fixing minimum and overtime rates of wages, and proceeded to make the following Orders:—

Bedfordshire and Huntingdonshire.—An Order continuing the existing minimum and overtime rates of wages from February 23, 1936 (i.e., the day following that on which the existing rates are due to expire), until February 20, 1937. The minimum rates for male workers of 21 years of age and over are 31s. 6d. per week of 50 hours in summer, except in the weeks in which Easter Monday and Whit Monday fall, when the hours are 41, and 48 hours in winter except in the week in which Christmas Day and Boxing Day fall, when the hours are 31, with overtime at 9½d. per hour on weekdays, 10½d. per hour on Easter Monday, Whit Monday, Christmas Day and Boxing Day, and 11½d. on Sundays. The minimum rate for female workers of 18 years of age and over is 6½d. per hour with overtime at 7½d. per hour on weekdays, 8½d. per hour on Easter Monday, Whit Monday, Christmas Day and Boxing Day, and 9½d. per hour on Sundays.

Cambridgeshire and Isle of Ely.—An Order fixing minimum and overtime rates to come into force on March 1, 1936 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until February 28, 1937. The minimum rates are (1) for male workers of 21 years of age and over employed wholly or mainly as horsemen, cowmen or shepherds (other than workers employed solely as stockmen or yardmen), 38s. 6d. (as at present) per week of the hours necessary for the performance of their customary duties; (2) for other male workers of 21 years of age and over, 31s. 6d. (as at present) per week of 48 hours in winter, except in the week in which Christmas Day and Boxing Day fall, when the hours are 31, and 50 hours in summer, except in the weeks in which Good Friday, Whit Monday and August Bank Holiday fall, when the hours are 42, provision being made for an adjustment of the hours in respect of which the minimum weekly wage is payable in the week in which August Bank Holiday falls to meet cases where an alternative holiday is given on July 27, 1936; and (3) for female workers of 18 years of age and over 6d. (instead of 5½d. as at present) per hour, with overtime at 7d. per hour as at present. The overtime rates for male workers of 21 years of age and over specified in (2) above are unchanged at 9d. per hour on weekdays and 11d. per hour on Sundays, Christmas Day, Boxing Day, Good Friday, Whit Monday and August Bank Holiday.

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Middlesex.—An Order fixing minimum and overtime rates of wages to come into force on March 1, 1936 (i.e., the day following that on which the existing rates are due to expire), and to continue in operation until February 27, 1937. The minimum rates are (1) in the case of workers employed wholly or mainly on the duties of stockmen, male workers of 21 years of age and over, 42s. 6d. (instead of 41s. 3d. as at present), and female workers of 18 years of age and over, 30s. per week of 40 hours in the week in which Christmas Day and Boxing Day fall, 50 hours in the weeks in which Easter Monday, Whit Monday, August Bank Holiday and any other bank holiday which may be proclaimed by Royal Proclamation fall, and 60 hours in any other week; (2) in the case of workers employed wholly or mainly as carters, male workers of 21 years of age and over, 39s. 8d. (instead of 38s. 6d. as at present), and female workers of 18 years of age and over, 28s. per week of 38 hours in the week in which Christmas Day and Boxing Day fall, 47 hours in the weeks in which Easter Monday, Whit Monday, August Bank Holiday and any other bank holiday which may be proclaimed by Royal Proclamation fall, and 56 hours in any other week; (3) in the case of casual workers, male workers of 21 years of age and over 8½d. per hour (instead of 8¼d. per hour as at present) and female workers of 18 years of age and over 6d. per hour; and (4) in the case of other workers, male workers of 21 years of age and over, 35s. 5d. (instead of 34s. 4½d. as at present) in summer, and 34s. (instead of 33s. as at present) in winter, and female workers of 18 years of age and over, 25s. in summer, and 24s. in winter per week of 42 hours in the weeks in which Easter Monday, Whit Monday, August Bank Holiday and any other bank holiday which may be proclaimed by Royal Proclamation fall, 30 hours in the week in which Christmas Day and Boxing Day fall, 50 hours in any other week in summer and 48 hours in any other week in winter. The overtime rate for all male workers of 21 years of age and over is unchanged at 10¼d. per hour, and in the case of female workers of 18 years of age and over unchanged at 7¼d. per hour.

Monmouthshire.—An Order continuing the existing minimum and overtime rates of wages from March 16, 1936 (i.e., the day following that on which the existing rates are due to expire), until September 15, 1936. The minimum rates for male workers of 21 years of age and over are 32s. per week of 54 hours with overtime at 9¼d. per hour on weekdays and 11½d. per hour on Sundays, Good Friday, Easter Monday, Whit Monday and August Bank Holiday. The minimum rate for female workers of 17 years of age and over is 6d. per hour for all time worked.

Oxfordshire.—An Order continuing the existing minimum and overtime rates of wages from March 2, 1936 (i.e., the day following that on which the existing rates are due to expire), until March 7, 1937. The minimum rates for male workers of 21 years of age and over are 31s. 6d. per week of 50 hours in summer, except in the weeks in which Good Friday, Easter Monday, Whit Monday and August Bank Holiday fall, when the hours are 41, and 48 hours in winter, except in the week in which Christmas Day and Boxing Day fall, when the hours are 31, with overtime throughout the period at 9¼d. per hour on weekdays and 11½d. per hour on Sundays, Good Friday, Easter Monday, Whit Monday, August Bank Holiday, Christmas Day and Boxing Day. The minimum rate for female workers of 18 years of age and over is 6¼d. per hour with overtime at 8d. per hour on weekdays and 9¼d. per hour

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on Sundays, Good Friday, Easter Monday, Whit Monday, August Bank Holiday, Christmas Day and Boxing Day.

Glamorganshire.—An Order continuing the existing minimum and overtime rates of wages from March 2, 1936 (i.e., the day following that on which the existing rates are due to expire), until March 1, 1937. The minimum rates for male workers of 21 years of age and over employed wholly or mainly as stockmen, cattlemen, cowmen, horsemen, shepherds or bailiffs, are 37s. per week of 60 hours with overtime at 10d. per hour, and for other male workers of 21 years of age and over, 33s. 6d. per week of 52 hours in summer and 48 hours in winter, with overtime at 9d. per hour on weekdays, and 10d. per hour on Sundays. For female workers of 18 years of age and over the minimum rate is 6d. per hour with overtime at 7d. per hour on weekdays and 7½d. per hour on Sundays.

Enforcement of Minimum Rates of Wages.—During the month ending February 13, 1936, legal proceedings were taken against eight employers for failure to pay the minimum rates of wages fixed by the Orders of the Agricultural Wages Board. Particulars of the cases follow :—

Committee Area	Court	Fines imposed	Costs allowed	Arrears of wages ordered	No. of workers involved
		£ s. d.	£ s. d.	£ s. d.	
Derby	Renishaw ..	1 10 0	3 15 0	51 11 9	3
"	Matlock ..	4 0 0	2 12 0	19 0 0	1
"	Bakewell ..	1 0 0	—	40 0 0	1
"	Ashbourne ..	2 0 0	0 4 0	15 0 0	1
Lincs, Holland	Boston ..	12 0 0	—	15 14 0	3
Notts	Worksop ..	6 0 0	—	43 4 8	6
Yorks, W.R.	Otley ..	1 0 0	0 2 6	6 0 9	1
Carmarthen ..	Newcastle Emlyn	*	†	30 0 0	1
		£ 27 10 0	6 13 6	220 11 2	17

* Dismissed under the Probation of Offenders Act.

† Costs awarded but amount not yet determined.

Foot-and-Mouth Disease.—Orders were issued releasing the South Wales infected area on January 31, and the Oxfordshire infected area on February 2. Another outbreak of Foot-and-Mouth disease was confirmed in the Wiltshire infected area on January 26. As no further outbreak has occurred in this area, it was released from general restrictions on February 24.

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APPOINTMENTS

COUNTY AGRICULTURAL EDUCATION STAFFS

England

Cornwall: Miss R. Hambly has been appointed Assistant Instructor in Dairying.

Mr. A. G. Warren, N.D.P., has been appointed County Poultry Instructor in succession to Mr. C. H. Toy who retires in April.

Sussex East: Mr. G. R. John has been appointed Instructor in Manual Processes at the School of Agriculture, Plumpton, *vice* Mr. H. E. Candy, deceased.

STAFFS OF AGRICULTURAL RESEARCH INSTITUTES

Rothamsted Experimental Station, Harpenden.—Mr. F. C. Bawden, M.A., has been appointed Virus Physiologist, *vice* Dr. John Caldwell, who has left to take up the post of Lecturer in Botany at University College, Exeter.

Mr. Bawden, who was College Scholar at Emmanuel College, Cambridge, was trained in Plant Pathology under Mr. F. T. Brooks, and, since June, 1930, has been Research Assistant at the Potato Virus Research Station, School of Agriculture, Cambridge.

NOTICES OF BOOKS

- ✓ **Land Settlement: A Report prepared for the Carnegie United Kingdom Trustees.** By A. W. Menzies Kitchin, M.A., B.Sc. Trustees' Foreword by Lord Elgin. Pp. xvi + 175. (Edinburgh: T. & A. Constable Ltd. 1935.)

This Report is the result of sincere independent thinking on the situation and on the materials available. It provides a very valuable contribution to the literature of small holdings.

The author, in his own preface, indicates that he has approached the subject mainly from the viewpoint of the unemployment problem. "The present interest in land settlement springs from a readily understood desire to alleviate the conditions of the unemployed and there is reason to suppose that, if there were no unemployment problem, there would be no movement to place people on the land." The success of any settlement policy must mean a "net" decrease in the nation's unemployment. It contributes nothing if settling so many coalminers means displacing an equal number of existing workers from agriculture. Neither does it contribute anything if it results, through the interactions of trade, in decreased employment in other industries, particularly in the export industries. Again, it is argued, the main issue is not whether it is possible to increase the physical output of agriculture in this country, but whether, having increased it, we shall be better off. There is no advantage in providing more work on the land if its main result is merely to depress the standard of living of those engaged in the agricultural industry, the financial returns of which are already relatively low. "To embark on a policy of land settlement without considering these possibilities is merely to beg the question."

NOTICES OF BOOKS

After an introductory chapter on scope and method, the author groups, in Chapter II, certain broad considerations of a social and economic character that have a bearing on land settlement policy; increased world production of agricultural products, technical progress, the declining trend of the population, etc., all tending to encourage the belief that fewer men and not more will be required on the land.

Chapter III deals with economic considerations. It gives statistical tables of numbers of persons engaged in agriculture in this and other countries, numbers of wage-earners, agricultural output, area under agriculture, size and distribution of holdings. The chapter concludes with a brief examination of considerations relating to the balance of trade and a discussion of co-operation.

Chapter IV summarizes land settlement legislation in Great Britain, Germany, Denmark and Holland.

Chapter V contains some of the results of Mr. Kitchin's tour of small holdings in over twenty counties in England. In this connexion there is also a long Appendix summarizing the replies to a questionnaire by County Council land agents.

Chapters VI and VII give a valuable analysis of production and markets for those commodities in the production of which it is said the small farm has a distinct chance, namely, vegetables, pigs and poultry. In these two chapters the author deals with the disadvantages and instability of the three- to five-acre holding that specializes in one or other of these commodities. It is maintained that, while restrictions of imports, e.g., of bacon, eggs and vegetables, may enable holdings of the three- to five-acre type to carry on successfully for a time, they will eventually come into direct competition with more economic units of production against which they will be unable to compete. There follows, in the next chapter, an interesting review of material made available in the surveys of East Anglia by the Farm Economics Branch of Cambridge University.

Chapter IX opens with the following statement: "In the preceding chapters of this Report various aspects of land settlement have been discussed. The conclusion has been reached that the opportunity for additional settlement in Great Britain, either from the wide issue of economic policy or from the more specific consideration of the small holding as a unit of agricultural production, is largely illusive." Mr. Kitchin goes on to say: "Nevertheless, it has been suggested that I should indicate the lines along which, in the event of land settlement being adopted for other than economic reasons, small holdings could be established with the minimum cost to the State." This chapter, therefore, deals with (1) the methods by which maximum efficiency within the productive unit can be obtained, and (2) the problem of evolving an organization capable of securing for these small holdings the advantages generally claimed for larger units of production. In the summary of conclusions Mr. Kitchin records the opinion that settlement by the County Councils has been carried out during the last few years as rapidly as is justified by economic conditions, and the rate of settlement is likely to increase as soon as conditions improve. He adds the opinion that this work has been organized efficiently.

Chapter X dealt with what are variously called part-time, supplementary or accessory holdings, and describes briefly the movement in U.S.A., Germany and Britain. The book has six useful appendices, three of which relate directly to small holdings and smallholders, a further two give the tables of imports and utilization of farm area in England and Wales, while a final appendix gives a list of references.

The whole embodies a very useful and opportune review of the interesting subject of land settlement in this country.

NOTICES OF BOOKS

Tropical Planting and Gardening. By H. F. Macmillan. 4th Ed. Pp. x + 560. Illus. (London: Macmillan & Co., Ltd. 1935. Price 25s.)

It is pleasing to record the appearance of a fourth edition of this well-known book, now commonly regarded as a standard work, the first edition of which appeared in 1910. The volume contains a wealth of information on gardening and planting in warm countries, with particular reference to Ceylon, where the author was for many years engaged in horticultural work. It gives information on all the economic plants in general cultivation in the tropics, and is profusely illustrated. It is, of course, intended primarily for residents in the tropics, but as so many everyday commodities and foodstuffs are derived from tropical plants the volume is not without interest to many residing in other parts of the world, and particularly to those who have occasion to handle tropical plant products.

The present edition does not differ fundamentally from its immediate predecessor, for the same general arrangement has been maintained. The title has been altered from "Tropical Gardening and Planting" to "Tropical Planting and Gardening," which appears somewhat unnecessary, particularly as the work deals more with tropical horticulture than with tropical agriculture or "planting." Certain sections in the book have been amplified or amended and the subject matter brought up-to-date and in accordance with recent advances in horticultural and agricultural science. The most important change is the incorporation of a chapter entitled "For arid and sub-desert regions—selections of trees, fruits, vegetables, etc." This should prove a valuable addition, for there is undoubtedly a dearth of horticultural literature relating to the "dry tropics," and many parts of the tropics that are now being developed—notably parts of East Africa—belong to this category.

A pleasing feature of this edition is the substantial reduction in price—now 25s. as against 37s. 6d. for the third edition. This appears to have been effected without in any way detracting from the quality and appearance of the book.

The Ulster Year Book, 1935. Pp. xli + 306, and 10 figs. (Belfast: His Majesty's Stationery Office. Price 1s.)

This is the fourth issue of an official publication containing all the more important facts relating to Northern Ireland and its people. Sections are devoted to the physiography, population and vital statistics, land, production from natural sources, industry and trade, transport and communication, education, labour, state insurance, unemployment assistance and pensions, housing, health and poor relief, justice and police, public finance, local government finance, private finance and government of the Province. Agriculture remains the principal industry of Ulster, live stock being the branch that has developed most in a country where the mild climate enables cattle to be reared in the open during the greater part of the year. The Pig and Bacon Marketing Boards have now been supplemented by a Pig Industry Council, and a Joint Milk Council and an advisory committee to deal with drainage have been established. An instance of the co-operation of Northern Ireland with the rest of the United Kingdom is to be found in the Board recently set up in connexion with the herring industry. An article on "The Evolution of Agricultural Policy in Northern Ireland," by Mr. D. A. E. Harkness, M.A., of the Ulster Ministry of Agriculture, records the remarkable developments that have taken place during the past few years. The value of this useful work of reference is enhanced by maps and diagrams, a comprehensive statistical summary and an efficient index.

NOTICES OF BOOKS

Co-operation and the New Agricultural Policy. By the Horace Plunkett Foundation. Pp. viii + 136. (London: P. S. King & Son, Ltd. 1935. Price 5s.)

This work comprises a fairly exhaustive history of the development and operation of marketing organization in the United Kingdom, and a discussion of the effects of the new policy in relation to over- as producers, consumers and other interests. It shows, in particular, the relationship of marketing schemes to the voluntary co-operative efforts that preceded them, and notes that in this country little progress had been made in co-operative marketing on a purely voluntary basis. Moreover, only in a few cases abroad, notably in Denmark and Norway, has it been found practicable for State regulation of marketing to be built up on the foundation of agricultural co-operation. Measures have been taken in some countries to control marketing, either directly by the State as in Belgium, France and the Irish Free State, or through State-appointed organizations as in Germany and Holland. In other countries, e.g., Australia, New Zealand and Canada, commodity marketing boards, representative of producers, have been established and are functioning, largely as in this country, while in South Africa the tendency seems to be rather away from "compulsory co-operation" and towards a system of voluntary co-operation combined with State control of export.

Attention is called to the possible dangers in a policy that allows each commodity to look after itself, in view of the interchangeability between certain products of the farm and between the various food-stuffs to which consumers may adapt themselves. A coherent policy is essential. Developments in the co-ordination of marketing schemes are under way in both Australia and Canada.

Whilst the agricultural population in this country has benefited generally by the operation of marketing schemes and by subsidies and other State measures, and whilst the consumer has not been seriously affected by the raising of agricultural prices, it is pointed out that little progress has yet been made towards benefiting consumers through a more economically efficient distributive system.

The Use and Misuse of Land. By R. Maclagan Gorrie, D.Sc., F.R.S.E. Pp. 80. (Oxford: Clarendon Press. 1935. Price 6s.)

This closely-written but easily-read memoir is the fruit of a research fellowship given for the study of the correlation of erosion damage and grazing in forest lands, subsequently extended to include erosion control in farm lands. Under the climatic conditions of Great Britain it is not necessary to take special measures for the control of erosion except perhaps on the last fringes of the usable land; on the other hand, they enter materially into forestry practice, and for this the memoir provides parallel reading drawn from countries outside our own. If the descriptions, methods and recommendations have not great agricultural significance under home conditions, they are of general acceptance in other climates where the bulk of the stock farming of the world is carried on. The memoir, therefore, may be recommended to all who have to do with farming in the Empire and beyond. By the same token the very width of the title may mislead the home reader or buyer; he might have had the protection of an explanatory sub-title.

Répertoire International des Centres de Documentation Chimique (*International Repertory of Centres of Chemical Documentation*). Edited by J. Gérard. Pp. 115. (Paris: Office International de Chimie, 28 rue St.-Dominique. 1935.)

At a recent conference of the International Chemical Union the

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